UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

MAY, 1888.

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PREPARED UNDER THE DIRECTION OF
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1888.

List of merchant marine steam and sailing vessels from which International Meteorological reports were received at the Office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of May, 1888.

	Name of vessel.	Captain.
Br.	s. s. Adriatic	Capt. J. G. Cameron.
	Aquan	J. C. Adair.
	Ailsa	T. M. McKnight.
Am.	Alameda	G. H. Morse.
Br.	Alaska	Geo. S. Murray.
	Alene	H. H. Gissing.
Ger.	Allemania	N. F. Schrœder.
	Aller	H. Christoffers.
Br.	Alps	J. W. Tobin.
	Alsatia	J. Brown.
	Alvena	F. McKay.
	Alvo	D. Williams.
	Ambrose	E. Bisson.
Ger.	America	H. Heineke.
Dtch.	Amsterdam	F. W. Bonjer.
Br.	Amy Dora	J. J. Thompson.
	Anchoria	W. Brown.
Am.	Andes	J. Evans.
Br.	Ardanrigh	W. Anderson.
	Arizona	S. Brooks.
	Atlas	Jas. B. Watt.
	Aurania	W. H. P. Hains.
	Auretta	G. W. Read.
	Australia	A. McRitchie.
Ger.	Australia	G. Franck.
Br.	Ayrshire	D. Jenkins
Nor.	Balder	F. Mohn.
Br.	Baltic	E. Smith.
	Barracouta	R. R. Hubbard.
	Barrowmore	John Inch.
Ger.	Baumwall	C. W. Rehse.
	Braunschweig	Bödeker.
Br.	Bavarian	R. Leask.
Belg.	Belgenland	W. A. Beynon.
Br.	Bengore Head	J. R. Brady.
	Ben Ledi	S. Adamson.
Span.	Berrita	L. Santaulari.
Br.	Bessarabic	J. Martin.
	Bessel	Chas. J. Watson.
	Black Prince	J. Milburn.
	Borderer	F. Manley.
	Bosphorus	A. R. Smith.
	Bothnia	Thomas Dutton.
	Breakwater	J. E. Dale.
	Britannic	H. Parsell.
Fr.	Britannic	J. Parazoli.
Br.	British King	John Kelly.
	British Prince	S. Nowell.
	British Princess	E. H. Freeth.
	British Queen	R. Wills.
	Brooklyn City	W. Fitt.
	Buffalo	J. H. Malet.
	Bulgarian	E. Parry.
Fr.	Burgundia	F. Duiac.
	Cacher	Jules Delhomme.
Ger.	California	O. Winkler.
Br.	Canada	John Robinson.
Span.	Carolina	S. Arribi.
Br.	Caribbean	H. Daniel.
	Carroll	G. H. Brown.
	Caspian	A. McDougall.
	Catalonia	Edward Wylie.
	Celtic	P. J. Irving.
	Cephalonia	Henry Walker.
	Chester	S. Wohlmuth.
	Circassia	A. Campbell.
Am.	City of Augusta	J. W. Catherine.
Br.	City of Berlin	F. S. Land.
	City of Chester	R. Bond.
Am.	City of Chester	Th. Wallace.
Br.	City of Chicago	A. W. Lewis.
Am.	City of Dallas	C. W. Read.
Br.	City of Richmond	A. Redford.
Am.	City of Rio de Janeiro	W. B. Seabury.
Br.	City of Rome	H. Young.
Am.	City of Washington	J. W. Reynolds.
Br.	Claribel	Klinkokel.
Ger.	Colima	R. C. Jennings.
Br.	Colon	F. Henderson.
	Concordia	A. McLean.
	Corean	C. J. Menzies.
	Counsellor	W. Lang.
	Coventry	E. W. Crisp.
	Croma	W. P. Lord.
	Cyprus	E. Guild.
	Dalton	J. Russell
	Denmark	R. S. Rigby.
Belg.	DeRuyter	J. J. Brarens.
Br.	Devonia	John Craig.
	Discoverer	John Hughes.
	Don	R. Woodward.
Ger.	Donau	W. Tapser.
Br.	Dorian	J. McKeague.
Fr.	Dupuy de Lome	S. Dechaille.
Br.	Durham City	D. D. Galbraith.
	Earnmoor	R. Grey.
	Edith Godden	J. H. Bennett.
	Egypt	J. Sumner.
Ger.	Eider	H. Baur.
	Elbe	G. Meyer.
Am.	El Paso	H. S. Quick.
Ger.	Ems	Th. Jüngst.
Br.	England	A. F. Heeley.
	Erin	Wm. Tyson.
	Ethiopia	John Wilson.
	Etruria	T. Cook.
It.	Eutella	2d Off. D. Padone.
Br.	Exeter City	Capt. Thos. L. Weiss.
Nor.	Faedrelandet	A. C. Brunn.
Br.	France	A. D. Hadley.
Ger.	Fulda	R. Ringk.
Br.	Furnessia	J. Hedderwick.
	Galileo	R. T. Jones.
	Gallia	M. Murphy.
Dan.	Geiser	C. W. Möller.
Br.	Germanic	B. Gleadell.
	Glendale	W. Dickman.
Ger.	Gothia	H. Bauer.
Br.	Grecian	C. E. Le Gallais.
	Greece	A. J. Jeffrey.
Br.	Gussie	Robert Staples.

	Name of vessel.	Captain.
Ger.	Gwent	Capt. J. Lund.
	Hammonia	C. Hebich.
Dan.	Hekla	A. G. Thomsen.
Br.	Helvetia	G. Cochran.
	Herschel	G. Braithwaite.
Nor.	Hertha	M. C. Nygaard.
Br.	Hibernian	John Brown.
	Holland	Thos. Foote.
	Howick	J. Ellis.
Am.	Indiana	W. J. Boggs.
Br.	Inventor	Wm. Jones.
	Iowa	E. W. Owens.
	Iscia	W. Churnside.
Dan.	Island	W. Skjodt.
Br.	Istrian	T. H. Fox.
	Italy	W. Pearce.
	James Turpie	Wm. Smith.
Dan.	Jan Breydel	H. Meyer.
Br.	Kansas	W. Gleig.
Ger.	Kehrwieder	H. Spliest.
Fr.	La Bourgogne	E. Franguel.
	La Bretagne	M. de'Jousselin.
	La Champagne	L. Boyer.
	La Gascogne	Santelli.
Ger.	Lahn	H. Hellmers.
Br.	Lake Huron	M. L. Tranmar.
	Lake Ontario	H. Campbell.
	Lake Superior	Wm. Stewart.
	Lake Winnipeg	P. D. Murray.
Am.	Lampassas	M. B. Crowell.
Dtch.	Leerdam	G. Stenger.
Br.	Lero	C. H. Holltum.
Ger.	Lessing	H. Behrends.
Br.	Llandaff City	T. H. Gore.
	Lord Clive	P. Urquhart.
	Lord Gough	E. M. Hughes.
Am.	Lorenzo D. Baker	Warren F. Wiley
Br.	Ludgate Hill	Jas. Brown.
	Lydian Monarch	T. C. Huggett.
	Madura	K. Doyle.
Ger.	Main	Schunmann.
Am.	Manhattan	Frank Stevens.
Br.	Maranhense	F. B. Tregarthen.
	Marathon	T. Hewitson.
	Marecs	L. O. Moen.
	Marengo	T. M. Irwin.
	Marsala	N. Maas.
	Martello	Wm. Abbott.
	Maryland	A. H. Luckhurst.
	Mentmore	C. W. Simpson.
	Michigan	R. Griffiths.
	Mineola	T. L. Evans.
	Minnesota	R. J. Blacklin.
Ger.	Moravia	Ludwig.
	Mosselle	R. Rendle.
Span.	Murciano	E. de Luzzaraga.
Br.	Muriel	G. S. Locke.
	Nessmore	G. Elliott.
Am.	Nueces	Jas. Bolger.
Fr.	Neustria	P. Verriers.
Br.	Nevada	J. A. B. Cushing.
Am.	Newport	Chas. C. Lima.
Belg.	Noordland	H. E. Nickels.
Nor.	Norrona	J. J. Isakjen.
Br.	Norseman	R. Williams.
	Nova Scotian	R. H. Hughes.
Ger.	Nurnberg	H. Engelhardt.
Br.	Oceanic	H. Davison.
	Ocean Prince	W. J. Milburn.
	Ohio	R. W. Sargent.
Port.	Olinda	C. A. Machado.
Br.	Olympia	J. Swain.
Ger.	Oranje Nassau	J. A. J. La Crooy.
Br.	Oregon	H. C. Williams.
	Orinoco	J. S. Garvin.
	Paresian	W. H. Smith.
	Pavonia	H. McKay.
Dtch.	P. Caland	T. H. Bonjer.
Br.	Peconic	G. Evans.
	Pennsylvania	E. B. Thomas.
	Petriana	S. W. Ryder.
Am.	Philadelphia	Samuel Hess.
Belg.	Pieter de Coninck	E. Smit.
Ger.	Polaria	Burgwardt.
Br.	Pomeranean	H. Dalziel.
	Pomona	J. Legoe.
	Ponca	W. Bowen.
Dtch.	Prins Maurits	H Slinter.
Br.	Queen	T. Annison.
	Republic	H. Davison.
Ger.	Rhaetia	H. Vogelgesang.
	Rhein	W. Kuhlmann.
	Rhynland	J. C. Jamison.
Br.	Robina	T. H. Smith.
	Roman	E. Maddox.
Belg.	Rosse	T. Henning.
Dtch.	Rotterdam	G. Bakker.
Ger.	Rugia	R. Karlowa.
	Saale	H. Richter.
Br.	Sacrobosco	Henry Gibb.
	Saint Asaph	C. H. Hassack.
	Saint Ronans	H. Campbell.
	Samana	H. Bermpohl.
	Santiago	B. Potter.
	Sarmatian	Wm. Richardson
	Sarnia	J. Gibson.
	Scandinavian	John Park.
Dtch.	Schiedam	K. Mensonides.
Br.	Scythia	T. Roberts.
Span.	Serra	F. de Luzaraga.
Br.	Servia	H. McKay.
	Siberian	R. P. Moore.
	Sidonian	B. Jamison.
Ger.	Slavonia	H. Schmidt.
Br.	Spain	W. A. Griffiths.
	State of Georgia	G. Moodie.
	State of Indiana	A. Ritchie
Br. s. s.	State of Nebraska	A. G. Brace.
	State of Nevada	J. A. Stewart.
	State of Pennsylvania	A. J. A. Mann.
	State of Texas	Gilbert Williams.

	Name of vessel.	Captain.
	Stockholm City	Capt. A. Thompson.
	Straits of Gibraltar	Geo. Grigg.
Ger.	Suevia	H. Bahrends.
Fr.	Sully	A. Voisin.
Belg.	Switzerland	J. Ueberweg.
Br.	The Queen	T. P. Heeley.
Dan.	Thingvalla	S. T. H. Laub.
Br.	Thornhill	James Witherill.
Ger.	Thuringia	G. Reysing.
Br.	Toronto	
	Tower Hill	F. Archer.
	Trafalgar	John H Auld.
Ger.	Trave	W. Willigerod.
Br.	Trinidad	W. J. Fraser.
	Umbria	W. McMickan.
	Urbino	P. L. Moore.
Belg.	Vaderland	C. H. Grant.
Br.	Vancouver	C. J. Lindall.
	Victory	S. E. Coate.
Nor.	Viking	S. H. Früs.
Br.	Viola	L. Murray.
	Virginian	M. Fitt.
Belg	Waesland	H. Buschmann.
	Wergeland	L. W. Hansen.
Ger.	Werra	R. Bussnis.
	Weser	H. Bruns.
Belg.	Westernland	Com. W. G. Randle.
Ger.	Wieland	Capt. A. Albers.
Br.	Wisconsin	Edward Bentley.
	Wyanoke	R. B. Boas.
	Wylo	R. Miller.
	Wyoming	C. L. Rigby.
Nor.	Ydun	D. Hagerman.
Dtch.	Zaandam	W. Pausen.
	New York Herald Weather Service.	
Br.	s. s. Athos	H. Low.
Ger.	Bohemia	C. Kærdel.
Fr.	Chateau Lafite	C. Ollivier.
	Chateau Morquax	A. Sensin.
Am.	City of Alexandria	John Deakin.
	El Monte	J. W. Hawthorn
Ger.	Gellert	W. Kuhlewein.
Fr.	La Normandie	G. de Kersabiec.
	New Orleans	F. P. C. Halsey.
	Ocean	C. Schmidt
Ger.	Pennland	Rud Weyer.
Br.	Portia	Henry Dawson.
	Richmond Hill	A. Hyde.
	United States Naval.	
U. S. S	Atlanta	F. M. Bunce.
U. S. S.	Despatch	W. S. Cowles.
U. S. S.	Dolphin	G. F. F. Wide.
U. S. S.	Enterprise	B. H. McCall.
U. S. R. S.	Franklin	A. P. Cooke.
U. S. S.	Galena	C. M. Chester.
U. S. C. S.	Gedney	F. H. Crosby.
U. S. R. S.	Independence	J. W. Phillip.
U. S. S.	Jamestown	C. J. Train.
U. S. S.	Lancaster	T. F. Kane.
U. S. S.	Michigan	H. F. Picking.
U. S. S.	Minnesota	G. C. Wiltse.
U. S. S.	Ossipee	W. B. Hoff
U. S. S.	Pensacola	A. R. Yates.
U. S. S.	Pinta	John S. Newell.
U. S. S.	Portsmouth	Edwin White.
U. S. S.	Quinnebaug	W. M. Folger.
U. S. S.	Ranger	F. A. Cook.
U. S. S.	Richmond	Robert Boyd.
U. S. R. S.	St. Louis	Wm. Whitehead.
U. S. S.	Saratoga	C. H. Davis.
U. S. S.	Swatara	J. McGowan.
U S. S.	Vandalia	C. Schoonmaker.
U. S. S.	Trenton	O. F. Heyerman.
U. S. S.	Yantic	N. H. Farquhar.
	Sailing vessels.	
Am	bk. Abyssinian	Henry Hughes.
	Ada P. Gould	W. B. Henrahan
	Alice	W. G. Kair.
Br.	Arab Steed	C. A. Skantze.
Am.	Bonny Doon	Chas. Burgess.
Pilot boat	C. E. Knight	Jas. F. Springer.
Am.	sp. Chas S. Whitney	O. B. Morris.
Am.	bk. Chas. Loring	J. G. Theorutp.
	bg. Daisy Boynton	C. Hardin.
Br.	bk. Elgin	H. W. Robinson.
Am.	schr. Emily E. Thomson	G. T. Lecompte.
Br.	bk. Energy	Wm. McBride.
Am.	schr. Ethel A. Merritt	Thos. Battle.
	Fannie E. Walston	A. L. Cummings.
	bk. Florence	A. P. Carter.
Nor.	sp. Ferdinand	Lütken.
It.	bk. Fratelli Doge	G. Mattedo.
Am.	bk. George W. Sweeny	J. F. Hewitt.
Br.	Glenorchy	Alfred Ganior.
Nor.	Grundloven	O. G. Ellingsen.
Am.	bg. H. B. Hussey	G. W. Hodgdon.
Am.	bkt. Henry Warner	J. T. Paine.
Br.	bk. Iodine	Adam Smith.
Nor.	bk Johan Irgens	I. Iverson.
Am.	schr. John J. Hanson	L. J. Stevens.
Am.	bkt. Josephine	Chas. Brown.
Br.	bk. Levanter	Geo. F. Gerry.
Am.	bkt. Louise Adelaide	Edgar Orr.
	bg. L. Staples	J. P. Stowers.
	Mary Fink	
Aus.	bk. Mattea	G. V. Vidulich.
Nor.	Nanny	C. Wilhelm.
Am.	bk. Negunticook	Ed. E Wallace.
	schr. Nelson Bartlett	J. W. Watt.
	Orlando	Chas. Knaebel.
	Phœbe	M. Mederi.
Nor.	bk. Qvos	G. Olsen.
Ger.	sp. Shakspere	Carl Muller.
Br.	bk. Sapphire	G. W. Murray.
	Sodium	Wm Munson.
Ger.	sp. Sophie	H. Hasenfuss.
Am.	schr. Stephen Bennett	F. A. Magune.
Br.	sp. Trojan	M. Mosher.
Aus.	bk. Vitez	Paolo Drobay.
Am.	schr. Warren Adams	C. A. Calcord.
	bkt. Yose E. Moré	A. A. Lenhard.

UNITED STATES SIGNAL SERVICE

MONTHLY WEATHER REVIEW.

VOL. XVI. WASHINGTON CITY, MAY, 1888. No. 5.

INTRODUCTION.

This REVIEW treats generally the meteorological conditions of the United States and Canada for May, 1888, and is based upon the reports of regular and voluntary observers of both countries. Descriptions of the storms that occurred over the north Atlantic Ocean are also given, and their approximate paths shown on chart i, on which also appears the distribution of icebergs and field-ice and the limits of fog-belts west of the fortieth meridian.

Except over the northern and central plateau districts and the north Pacific coast region, where the mean temperatures exceeded the normal from 2° to 5°, the month was colder than the average May in all parts of the United States, the region of greatest deficiency of temperature being the upper Mississippi valley, where the means ranged from 6° to 9° below the normal.

The rainfall for May was largely deficient in the Rio Grande Valley, extreme northwest, and on the Pacific coast; it was also below the average in Florida, the lower lakes, middle slope, and middle and northern plateau districts, but the deficiencies in these latter districts were less marked than in those first named. In New England, the middle Atlantic and east Gulf states, the upper Mississippi and Missouri valleys, and northern slope there was a large excess over the average rainfall.

A destructive flood prevailed in the upper Mississippi river during the first and second decades of the month, causing extensive loss of property in the towns and cities along its banks in the states of Minnesota, Wisconsin, Iowa, Missouri, and Illinois.

In the preparation of this REVIEW the following data, received up to June 20, 1888, have been used, viz., the regular tri-daily weather-charts, containing data of simultaneous observations taken at 133 Signal Service stations and 23 Canadian stations, as telegraphed to this office; 177 monthly journals and 175 monthly means from the former and 23 monthly means from the latter: 352 monthly registers from voluntary observers; 60 monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the Hydrographic Office, United States Navy, and the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New England, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, and Tennessee, and the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean pressure for May, 1888, determined from the tri-daily telegraphic observations of the Signal Service, is shown by isobarometric lines on chart ii. The isobar of 30.00, showing the regions of greatest mean pressure for May, 1888, extends along the Atlantic coast from Florida to Nova Scotia, the station reporting the maximum mean pressure, 30.04, being Hatteras, N. C. In all other regions covered by the observations the mean pressure was below 30.00, with the exception of a single station, viz., Tatoosh Island, Wash., where the mean just reached that figure. The region of minimum mean pressure embraces the southern Rocky Mountain and plateau districts, where the pressure falls below 29.85.

The departures from the normal pressure at the various Signal Service stations are given in the table of miscellaneous meteorological data. Comparison with the normal pressure shows a deficiency in all parts of the country, with the exception of the extreme northwest, New England, and the Maritime Provinces of Canada, where there was a slight excess, generally less than .05. The deficiencies range from .05 to .10 over about one-half of the entire country, being most marked on the north Pacific coast. While the mean pressure for this month was for the most part below the normal, the preceding month was characterized by unusually high mean pressure over nearly the whole country.

The barometric means of April and May, 1888, compared, shows the latter to range .10 to .20 below the former over nearly the whole country, the decrease being most marked over the region from the Great Lakes to the Gulf of Mexico. A very slight increase is shown over the Gulf of Saint Lawrence.

BAROMETRIC RANGES.

The monthly barometric ranges at the various Signal Service stations are also given in the table of miscellaneous meteorological data. The ranges, as usual, conform to the general rule; that is, they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. In the states bordering on the Atlantic the extreme ranges were .33 at Key West, Fla., and .61 at Block Island, R. I.; between the eighty-fifth and one hundredth meridians, .36 at Galveston, Tex., and 1.05 at Marquette, Mich.; eastern slope of the Rocky Mountains, .46 at Fort Davis, Tex., and 1.01 at Denver, Colo.; plateau region, .35 at Fort Grant, Ariz., and .77 at Fort Bridger, Wyo.; Pacific coast, .28 at San Diego, Cal., and .60 at Portland, Oregon. The ranges for this month over the whole country differ but slightly from the normal.

AREAS OF HIGH PRESSURE.

Five well-defined areas of high pressure were observed during the month of May, three of which approached the north Pacific coast from west to southwest, and, after being retarded while the centre of greatest pressure was near the coast line, moved to the eastward of the Rocky Mountains in a direction

to the south of east, passing over the eastern slope of the Rocky Mountains, where the easterly movement was again retarded, after which the movement to the Atlantic coast was rapid and more directly to the eastward. Two areas of high pressure were first observed in British America, one of which probably originated over the north Pacific. Both of these areas passed over the Saint Lawrence to the Atlantic, moving directly to the eastward.

The following table shows the approximate latitude and longitude in which the centre of each area of high pressure was first and last observed, the highest observed barometer reading attending each, and the average rate of movement in miles per hour:

Number of area.	First observed.		Last observed.		Highest observed barometer reading.	Average hourly movement.
	Lat. N.	Long. W.	Lat. N.	Long. W.		
	° ′	° ′	° ′	° ′	*Inches.*	*Miles.*
I	51 00	87 00	45 00	59 00	30.34	11.0
II	48 00	126 00	36 00	70 00	30.48	27.0
III	42 00	127 00	34 00	93 00	30.26	19.0
			34 00	83 00		31.0
IV	52 00	114 00	46 00	65 00	30.36	17.0
V	44 00	128 00	37 00	102 00	30.20	25.0

Average rate of progress, 22.0 miles per hour.

I.—This area of high pressure covered the northern part of the Lake region on the 1st of the month; it extended southward, covering the entire portion of the United States east of the Mississippi River, while the centre moved eastward over the Saint Lawrence Valley during the 2d, 3d, and 4th. It was preceded immediately to the eastward by a well-defined area of low pressure to the eastward of Nova Scotia, and was followed by a storm of considerable energy in the Lake region, while the ridge of high pressure extended from the Saint Lawrence Valley southward along the Atlantic coast to Florida. The pressure increased until the area had passed the seventy-second meridian, after which it decreased slowly as the area moved eastward over the north Atlantic in advance of the storm in the Lake region. This area of high pressure was attended by fair weather and cool northerly winds over the greater part of the east portion of the United States during the first three days of the month, except in New England, where it was preceded by rain, turning to snow.

II.—This area approached the north Pacific coast from the westward, and was central near the mouth of the Columbia River on the morning of the 4th. It remained almost stationary in this region until after the morning of the 5th, when it was apparently reinforced from the region north of Montana, and an extended area of high pressure formed, covering the Lake region, Minnesota, Dakota, and the northern Rocky Mountain region during the 6th and 7th. A well-defined low area moved northeastward from Texas to the central valleys while this high area extended over the northern portion of the United States, and the cold northerly winds in the northern quadrants of the storm were attended by very heavy rains during the 7th and 8th, the belt of rain extending from Kansas and Nebraska eastward to the Atlantic coast, the heaviest rains occurring in the central valleys. This area passed southeastward over the Saint Lawrence Valley and the middle Atlantic states on the 8th, the pressure decreasing with the easterly movement. It was still observed to the east of Hatteras, N. C., at midnight of the 9th. Heavy rains occurred in Florida, and general rains throughout the south Atlantic states while this area was central to the east of Hatteras.

III.—This area of high pressure was first observed to the west of northern California on the 8th, moving northeastward from the region of permanent high pressure in the Pacific. It advanced over this course until the centre had apparently reached the mouth of the Columbia River, where it remained almost stationary until the morning of the 11th, after which it moved southeastward and covered the central Rocky Mountains on the morning of the 12th, replacing an area of low pressure which was central in that region on the 11th. After passing to the eastward of the Rocky Mountains, this area extended, covering the central valleys from the Gulf to the British possessions. Two areas of high pressure formed on the eastern slope during the 12th, one of which covered northern Texas, and the other the upper Missouri valley. The pressure within the former decreased and the area disappeared after passing over the lower Mississippi valley on the 13th, while the pressure increased in the Northwest and the last-named area moved to the southeastward, following the general course of the Missouri Valley during the 13th and 14th, the pressure diminishing during the southeasterly movement until the night of the 15th, when it had passed over the Southern States and was central to the eastward of Florida.

IV.—This area of high pressure appeared to the northward of Montana on the 15th, while an extended area of low pressure covered the central Rocky Mountain and plateau regions. The southeasterly movement of this area of high pressure during the 15th apparently forced the eastern portion of the low area to the southward over Texas, leaving a well-defined area of low pressure over the central plateau regions. This high area extended eastward during the 16th and 17th, covering the central valleys and Lake region, and on the morning of the 17th the centre of greatest pressure was north of Minnesota, while a secondary area of high pressure formed over the middle Atlantic states. The disturbance previously referred to as covering the central plateau regions on the 15th moved slowly southeastward to northern Texas and, afterwards, rapidly to the northeast, apparently dividing the area of high pressure, the eastern portion of which moved off the middle Atlantic coast and the northern portion, or principal area of high pressure, moving southward in rear of the dividing storm. It was central in Nebraska and covered the eastern slope of the Rocky Mountains on the 18th, after which it moved eastward, following the general course of the low area which preceded it, until it reached the Saint Lawrence Valley on the 21st. It covered the greater portion of the United States east of the Rocky Mountains while central within the limits of the stations of observations. It passed eastward over New England during the 22d, after which its course was apparently northeastward.

V.—This area of high pressure was observed westward of Oregon on the 26th, apparently moving slowly northeastward from the Pacific. Its centre reached the coast line of Washington Territory on the morning of the 27th, when the barometer was high over the northern plateau and northern Rocky Mountain regions, and an area of low pressure covered the lower Missouri valley. After reaching the Oregon coast the direction of movement changed to the southeast, and in the next twenty-four hours it had extended over the Rocky Mountain regions and was central in Colorado. The southeasterly movement continued until the 29th, the pressure diminishing while the area extended over the eastern slope of the Rocky Mountains and central valleys, after which it disappeared. It was last located as a well-defined area of high pressure central in northern Texas on the 29th.

AREAS OF LOW PRESSURE.

Ten areas of low pressure were observed within the limits of the United States during the month of May. The region of greatest storm frequency extended from northern Texas and Colorado northeastward to Lake Michigan, and while no barometric depressions have been traced from the Pacific coast eastward, more than one-half of the disturbances observed during the month were preceded by extended depressions over the plateau regions. Two areas of low pressure were first observed north of Idaho and moved southeastward over the eastern slope of the Rocky Mountains but did not develop sufficient energy to reach the Atlantic coast, and one low area was observed off the middle Atlantic coast, moving northeastward.

From chart i it will be seen that no decided storm passed over the Southern States and that only one slight disturbance was traced along the Atlantic coast, while the five disturb-

ances traced eastward of the Mississippi River moved northeastward to the west of the Saint Lawrence River, not reaching the Atlantic within the limits of observation.

The following table shows the latitude and longitude in which each area of low pressure was first and last observed, the lowest pressure observed within each area, and the average velocity in miles per hour:

Number of area.	First observed.		Last observed.		Lowest observed barometer reading.	Average hourly velocity.
	Lat. N.	Long. W.	Lat. N.	Long. W.		
	° ′	° ′	° ′	° ′	*Inches.*	*Miles.*
I	40 15	72 00	43 45	61 30	29.60	43.3
II	41 20	117 00	49 45	86 00	29.36	21.0
III	38 00	104 40	42 00	86 45	29.56	16.7
IV	52 50	116 00	50 45	91 15	29.22	16.0
V	40 00	91 25	48 30	78 00	29.40	41.7
VI	53 00	114 45	35 40	89 30	29.60	36.4
VII	40 20	112 25	44 20	75 00	29.48	27.8
VIII	39 20	102 30	44 20	92 45	29.64	21.2
IX	40 00	86 00	45 40	80 45	29.68	18.2
X	39 10	110 00	47 30	73 00	29. 2	26.0

Average rate of progress, 26.8 miles per hour.

I.—This storm originated in northern Texas during the preceding month and moved northeastward over the Ohio Valley and middle Atlantic states, where it was central on the morning of the 1st, the disturbance extending over New England, the middle Atlantic states, and the lower lake region. After reaching the coast line it moved rapidly northeastward, developing considerable energy in the vicinity of Eastport, Me., where the barometer fell to the minimum, 29.60, on the afternoon of the 1st. From this point the centre moved more to the eastward, and it disappeared over the Atlantic during the 2d. It was followed in New England by rain and snow and this by cold, clearing weather during the 2d.

II.—This area of low pressure was central over northern Nevada at the last report of the preceding month. It passed to the eastward of the Rocky Mountains during the 1st, and on the 2d it appeared as a well-marked elliptical depression, extending from northern Texas to Iowa, bounded by the isobars of 29.5, 29.6, and 29.7. Heavy rains occurred in the northern half of this disturbance, as it covered the regions between the Mississippi River and Rocky Mountains. It moved in the direction of its longer axis during the 3d, becoming circular in form and contracting upon reaching the upper Mississippi valley. The barometer rose slightly at the centre during the northeasterly movement, the lowest pressure, 29.36, being observed in western Kansas on the 2d. The northeasterly course continued during the 3d and 4th, when it passed north of the Lake region, followed by strong westerly winds at lake stations. This storm apparently reached its maximum energy while passing over Wisconsin, although the barometer was rising at the centre of the disturbance.

III.—Number iii was central over southern Colorado and New Mexico on the 6th, and apparently resulted from an extended area of low pressure which covered the plateau regions on the 4th and 5th. Local rains occurred throughout the southern portion of the Rocky Mountain regions on the 5th, and very heavy rains occurred over the eastern slope of the Rocky Mountains from Texas to the Missouri Valley during the 6th. The course of this disturbance was first southward from Colorado to Texas, and afterwards to the northeastward to eastern Kansas, when it became extended, covering the central valleys and causing heavy rains from the lower lake region westward to the Missouri Valley. Heavy rains were also reported on the Gulf coast while this disturbance was central near Saint Louis, Mo. After reaching southern Michigan this disturbance disappeared by gradual increase of pressure. The centre was last observed on the morning of the 9th in southern Wisconsin, having been apparently drawn to the northwestward by a second disturbance which was then moving eastward north of the upper Missouri valley.

IV.—On the morning of the 8th this disturbance was central to the north of Montana and it moved southeastward to northern Dakota during the succeeding twenty-four hours, after which it receded to the northward and moved eastward, the pressure at the centre falling to 29.22 near the centre on the morning of the 10th. The trough of low pressure extended over the eastern slope of the Rocky Mountains while the principal disturbance remained to the north of Manitoba. A secondary disturbance was formed within the southern portion of this barometric trough, which, after remaining central in the vicinity of northern Texas on the 10th and 11th, apparently filled up by a high area from the Rocky Mountain regions, while a second formed in the upper Mississippi valley on the 11th and has been traced as number v.

V.—This area of low pressure covered the Lake region, attended by general rains throughout the the Northern States on the 11th and 12th. It moved northeastward with increasing energy, the barometer reaching the minimum, 29.30, while the disturbance was passing over the northern portion of Lake Huron. Areas of high pressure were observed to the east and west of this low area within the limits of the weather chart. Heavy rains occurred in New England during the 12th, attended by brisk easterly winds, and in the Lake region brisk and high westerly winds and clearing weather prevailed on the same date. This storm disappeared to the north of the Lake region on the 13th, leaving secondary disturbances along the New England and middle Atlantic coasts, which were attended by light rains and brisk to high winds until the 15th.

VI.—This storm developed north of Montana and moved southward over the eastern slope of the Rocky Mountains during the 14th and 15th. Its course was almost directly southward from the upper Missouri valley to northern Texas, where it was central on the afternoon of the 15th. It apparently formed the eastern portion of an extended low area which covered the plateau regions, and was followed in its southerly movement by an area of high pressure which followed directly in the track of its centre and apparently forced this depression to the southward. After the centre reached the latitude of 35° the depression extended eastward to the Mississippi Valley, where it disappeared. The minimum pressure was observed when this area was central over northern Texas, at the point where the direction changed from northerly to easterly.

VII.—This disturbance formed in the western half of the depression which covered the plateau and Rocky Mountain regions and from which the low area previously described developed. It remained central over Utah and Colorado for forty-eight hours, moving slowly southeastward. It crossed to the east slope of the Rocky Mountains on the 17th, preceded by heavy rains throughout the Northwest. It changed direction to the northeast after reaching northern Texas on the 17th, and extended over the central valleys, attended by general rains except in the east Gulf and south Atlantic states. The rains were heavy in the west Gulf states after the winds shifted to the north and the disturbance moved northeastward with slowly increasing pressure at the centre, and was more marked as an area of rain, and the depression apparently lost energy during the easterly movement. It moved northeastward over the Saint Lawrence Valley and probably disappeared to the eastward on the 22d.

VIII and IX.—This storm also developed over the central plateau region, where it was central on the 20th and 21st, but no definite movement of the centre could be traced until a secondary area formed to the eastward in Colorado on the 22d. This secondary disturbance moved to the northeastward to the upper Mississippi valley, leaving a depression over the central plateau region. The barometer was generally low over the central valleys, and this disturbance became less clearly defined by bounding isobars until it disappeared by increase of pressure in the upper Mississippi valley. Within the extended trough of low pressure above referred to, the disturbance traced as number ix developed on the 25th. Heavy rains occurred throughout the Lake region and in the northern portion of the states of the Ohio Valley while this disturbance

moved over Lakes Erie and Huron, and it disappeared to the northward on the 26th.

X.—This area of low pressure was central in Utah on the afternoon of the 25th, and moved southeastward to northern Texas, where it was central on the morning of the 26th. It moved northeastward from this position with decreasing pressure at the centre until it reached the Mississippi Valley, and it was attended by heavy rains generally throughout the Northern States, lower Mississippi valley, and west Gulf states. It remained almost stationary in the upper Mississippi valley during the 27th, after which it extended northeastward and moved rapidly over the Lake region to the Saint Lawrence Valley. The minimum pressure, 29.42, was observed while this area was central near Keokuk, Iowa, on the afternoon of the 27th. This condition was followed by a slight increase of pressure at the centre during the easterly movement until the storm had passed over the Lake region, after which the pressure at the centre fell again to 29.42, accompanied by strong westerly gales in the lower lake region. The disturbance disappeared to the northeast on the 30th.

NORTH ATLANTIC STORMS FOR MAY, 1888.

[*Pressure in inches and millimetres; wind-force by Beaufort scale.*]

The paths of the depressions that appeared over the north Atlantic Ocean during May, 1888, have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels, received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Eleven depressions have been traced, of which six advanced eastward over northern Newfoundland; three first appeared over mid-ocean; one apparently developed west of the British Isles; and one moved northwestward from the Caribbean Sea into the Gulf of Mexico. The general direction of movement of the depressions was east-northeast, although, in instances, marked irregularities in their advance was shown. One depression traversed the ocean from coast to coast. The month opened with unsettled and stormy weather over the entire ocean. The depression central over Ireland April 30th had moved northeasterly over Scotland, attended by barometric pressure falling below 29.00 (736.6); a storm of great energy was central over mid-ocean, while off the American coast, in the vicinity of the fortieth parallel, a disturbance of moderate strength appeared. From the 2d to the 6th there was an apparent transition of high barometric pressure from the Azores to the British Isles, during which period a depression moved northeastward from south of Nova Scotia and disappeared in the direction of Iceland. From the 6th to the 10th high barometric pressure and fair weather prevailed over the eastern portion of the ocean, while in the vicinity of Newfoundland the passage of two depressions of small energy occasioned moderate to fresh gales. During the last half of the second decade of the month stormy weather prevailed over the British Isles, attending the irregular movements of a depression to the westward; to the westward of the fortieth meridian the weather was changeable, with frequent and marked barometric fluctuations. During the third decade the barometer continued high east of the thirtieth meridian until the 26th, from which date until the 30th, inclusive, stormy weather prevailed in that region. From the 21st to the 24th a storm of pronounced energy moved eastward over the Banks of Newfoundland from the Gulf of Mexico, and thence passed northward toward Greenland. The latter portion of the month was chiefly characterized by the passage of a depression from the Gulf of Mexico to the British Isles. The storm which is given a probable track from the Caribbean Sea into the Gulf of Mexico from the 9th to the 11th, while unimportant as regards strength, would seem to indicate the development of meteorological conditions in the tropical north Atlantic favorable for the summer cyclones peculiar to that region.

In May, 1887, eleven depressions were traced, of which two traversed the ocean from coast to coast; one originated over the Caribbean Sea and moved northward over Cuba; one first appeared south of Bermuda and advanced northward; one passed eastward from the American coast in about N. 41° and subsequently moved northward; four developed to the southward or southeastward of Nova Scotia or Newfoundland; one was first charted northeast of Newfoundland; and two appeared within the region of observation in European waters, one having advanced from the southwest and the other from the northwest. The general direction of movement of the depressions was east-northeast to the eastward of the fortieth meridian, while to the westward of that longitude the tracks were greatly diversified as regards position and direction. The general character of the weather over the ocean was seasonable, and the depressions which appeared corresponded closely with the average for the month as regards position, number, and direction of movement. The severest disturbances prevailed over mid-ocean from the 22d to the 25th, inclusive.

The depressions of May, 1888, were of about normal intensity, and in distribution, number, and direction of movement, corresponded with the average for the month.

In the following descriptions of the depressions traced, positions are given in degrees, latitude and longitude, except in cases where twenty-five to thirty-five minutes are cited, when they are shown in degrees and half degrees:

1.—This depression was central on the 1st in about N. 52°, W. 27°, with barometric minimum about 29.20 (741.7), whence it advanced to N. 57°, W. 17°, by the 2d, after which it passed to the north of the British Isles, with fresh to strong gales.

2.—This depression occupied the ocean off the American coast in the vicinity of the forty-first parallel on the 1st, whence it moved east-northeast to the sixtieth meridian by the 2d, in which locality it remained nearly stationary until the 3d; by the 4th the storm-centre had passed northward to Newfoundland, subsequent to which date it recurved south of east and then advanced rapidly northeastward and disappeared in the direction of Iceland after the 6th. This storm developed marked energy while traversing Newfoundland and the Grand Banks, where barometric pressure falling below 29.60 (751.8) was shown.

3.—This was a depression of moderate energy which passed eastward from the Gulf of Saint Lawrence during the 7th, and on the 8th was central northeast of Newfoundland, from which position the storm-centre moved northeast and disappeared north of the region of observation after the 9th.

4.—The presence of this depression over or near the western portion of Cuba was indicated by reports of the 9th, to which locality it had apparently advanced from the Caribbean Sea; by the 10th the centre of depression had moved westward, and its approximated position on that date was to the northward of Yucatan; by the 11th the storm-centre had passed to the westward of the ninetieth meridian, after which its course cannot be determined by reports at hand. The limited data received from the region through which this disturbance passed, while indicating its small strength and probable track, will not admit of a more accurate definition of its characteristics.

5.—This depression passed southeast from the Gulf of Saint Lawrence during the 9th and on the morning of the 10th was central southeast of Newfoundland, with barometric pressure about 29.60 (751.8); by the 11th the centre of disturbance had moved northeast to N. 50°, W. 41°, with a marked decrease in central pressure. On this and the following date an area of high barometric pressure occupied the ocean east of the thirtieth meridian and had the apparent effect of deflecting the

depression westward, and a recurve of its path to N. 48°, W. 43°, is shown on the chart, in which position a marked loss of energy was apparent. Subsequent to the 12th the storm dissipated.

6.—This depression passed eastward from the American coast in the vicinity of the forty-first parallel on the 13th, and by the 14th had advanced to the sixty-fifth meridian. Under the apparent influence of an area of high barometric pressure which moved southeastward over Newfoundland from the 14th to the 16th the depression recurved to the northwestward by the 15th and remained nearly stationary south of Nova Scotia during that and the following date; by the 17th the storm had moved to the western part of Newfoundland, whence it passed south of east over the Grand Banks and thence advanced rapidly east-northeast to N. 51°, W. 27°, by the 20th, attended by fresh and strong increasing to whole gales. On the 20th the barometric pressure was high over the British Isles, and the depression recurved westward to N. 52°, W. 31°, with central pressure falling below 29.00 (736.6); by the 22d the storm had moved southwest and united with depression number 8 to the eastward of the Banks of Newfoundland.

7.—This was a depression of considerable energy which remained nearly stationary between the twentieth meridian and the Irish coast from the 15th to the 19th, inclusive, after which it apparently recurved to the southwestward and united with depression number 6. During the 16th, 17th, and 18th, fresh to strong gales and barometric pressure ranging from 29.10 (739.1) to 29.20 (741.7) were reported off the west coast of Ireland.

8.—This depression passed southeastward over the Gulf of Saint Lawrence during the 20th, and on the morning of the 21st was central east of Cape Breton Island, where small energy was shown; by the 22d the centre of disturbance had moved eastward to the forty-fifth meridian, attended by strong to whole gales and barometric pressure falling to about 29.10 (739.1). During the next two days the disturbance advanced northward without evidence of diminished energy, and disappeared north of the fifty-fifth parallel, its northerly curve being evidently due to the presence over the eastern portion of the ocean of an area of high barometer.

9.—This depression was central on the 20th over the eastern portion of the Gulf of Mexico, whence it moved slowly northeastward over Florida and off the coast to the fortieth parallel by the 25th, its passage being attended over the eastern part of the United States and the adjacent ocean by continuous rains. By the 26th the centre of disturbance had passed south of east to N. 38°, W. 62°, after which it pursued a normal east-northeast course to the British Isles by the 30th, accompanied during the 27th, 28th, and 29th, by barometric readings ranging from 29.10 (739.1) to 29.50 (749.3), and fresh to strong gales. This storm was probably of tropical origin, and in its slow progressive movement along the American coast presented the relatively high cyclonic barometric pressure, yet widespread influence which occasionally characterize storms which advance northward from the West Indies.

10.—This depression first appeared over mid-ocean north of the Azores on the 25th, and thence passed eastward to the southward of the British Isles by the 28th, without evidence of marked energy; subsequent to the 28th the centre of disturbance apparently recurved northwest and united with depression number 9.

11.—This depression probably developed off the southeast edge of the Banks of Newfoundland during the 29th; at noon, Greenwich time, of the 30th the storm was central in N. 40°, W. 38°, from which position it advanced northeast to the forty-fifth parallel by the 31st, with fresh to whole gales and barometric pressure falling to about 29.50 (749.3).

OCEAN ICE.

On chart i the positions of icebergs and field ice are shown by ruled shading. Ice and field ice were reported during the month as follows:

1st.—S. S. "Fremona," 55 miles east from Saint John's, field of ice interspersed with bergs.

2d.—S. S. "Fremona," from Cape Race to Saint Pierre Island, several large bergs.

4th.—S. S. "Baumwall," N. 47° 55′, W. 50° 10′, small icebergs. S. S. "Boston City," from Cape Saint Francis to Cape Race, solid field ice and huge bergs; drift ice between Cape Race and Cape Pine.

5th.—S. S. "Baumwall," from Ferryland to Cape Race, many large and small bergs; heavy pack ice in shore. S. S. "Lake Ontario," N. 46° 48′, W. 52° 40′, bergs and field ice.

6th.—S. S. "Colina," ten miles south by east from Cape Race, heavy field ice and small bergs.

10th.—S. S. "Damara," N. 46° 40′, W. 52° 05′, field ice and bergs. "S. S. "Peruvian," N. 46° 16′, W. 52° 46′, closely packed field ice and several bergs; off Cape Spear, became completely blocked with field ice and bergs. S. S. "Glendale," N. 45° 56′, W. 59° 39′, fields of ice.

11th.—S. S. "Sarnia," N. 48° 05′, W. 48° 55′ and N. 47° 51′, W. 49° 39′, icebergs.

12th.—S. S. "Sarnia," N. 46° 47′, W. 54° 26′, one large berg, and southeast of Cape Race to Cape Pine, field and pack ice. S. S. "Peruvian," from Saint John's, N. F., to within 56 miles of Cape Race, considerable quantities of field ice and bergs.

13th.—S. S. "Nubia," N. 44°, 00′, W. 48° 10′, several large bergs, and N. 42° 00′, W. 51° 00′, one large berg.

14th.—S. S. "Vandyck," N. 41° 00′, W. 46° 00′, icebergs; Low Point, C. B., heavy open ice in shore.

15th.—S. S. "Aline," N. 46° 00′ W. 51° 00′, to N. 46° 06′, W 53° 00′, a number of immense bergs.

17th.—S. S. "Lake Superior," N. 46° 21′, W. 53° 45′, several bergs and pieces. S. S. "Oregon," N. 47° 31′, W. 51° 05′, one large berg.

18th.—S. S. "Oregon," N. 46° 18′, W. 53° 46′ to N. 46° 20′, W. 54° 44′, huge bergs and several small ones. S. S. "Montana," N. 46° 20′, W. 54° 44′, several icebergs.

19th.—S. S. "Coventry," N. 47° 10′, W. 62° 35′, large detached pieces of ice. S. S. "Oregon," N. 46° 20′, W. 53° 46′ to N. 46° 18′, W. 54° 44′, several large bergs and lumps.

20th.—S. S. "Colina," 25 miles south of Cape Saint Mary, N. F., an immense field of ice and numerous bergs. S. S. "Holstein," N. 45° 52′, W. 54° 32′, one berg. S. S. "Portia," coast from Saint John's to Cape Race blocked with ice 14th to 20th.

21st.—S. S. "Coventry," N. 47° 10′, W. 62°, 59′, entered heavy packed ice and remained fast until the 26th. S. S. "Holstein," off Heath Point, Anticosti, several small bergs.

22d.—S. S. "Pomeranian," N. 46° 01′, W. 54° 08′ to N. 46° 10′, W. 54° 54′, small detached bergs; s. s. "Caspian," N. 47° 39′, W. 51° 00′, one large berg.

23d.—S. S. "Caspian," 30 miles west from Cape Race, thirty bergs.

24th.—S. S. "Caspian," 80 miles west from Cape Race, one very large berg.

26th.—S. S. "Corean," N. 45° 44′, W. 53° 43′, one large berg; s. s. "Dominion," Cape Race bearing S. 62° W., 20 miles, passed about fifty bergs to Cape Race.

27th.—S. S. "Corean," N. 45° 59′, W. 54° 40′, large berg.

28th.—S. S. "Lake Nepigon," Cape Race to Cape St. Mary, passed several bergs.

30th.—S. S. Wylo, 40 miles south from Cape Race, several large bergs; s. s. "Palino," numerous icebergs on the south and east coasts of Newfoundland.

31st.—S. S. "Vancouver," off Cape Race, two bergs.

As compared with the ice record for the preceding month, there has been a marked increase in the aggregate quantity of ice reported off the east and south coasts of Newfoundland and in the Gulf of Saint Lawrence, while the positions of detached ice fields and bergs remain materially the same.

Compared with the record of corresponding months of previous years, the reports for May, 1888, show that ice was observed somewhat to the southward of the average southern

limit and from one to two degrees west of the average eastern limit. Reports would also indicate that more than the usual amount of damage to shipping was caused by encounters with icebergs and heavy field ice, and that vessels were more frequently blocked or detained by ice massed off the Newfoundland coasts or in the Gulf of Saint Lawrence.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for May during the last six years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
May, 1883	40 30	47 00	May, 1883	45 40	45 12
May, 1884	41 30	47 30	May, 1884	43 30	44 50
May, 1885	40 50	48 15	May, 1885	42 30	40 10
May, 1886	41 36	51 30	May, 1886	48 55	46 13
May, 1887	39 38	46 00	May, 1887	39 38	46 00
May, 1888	41 00	46 00	May, 1888	41 00	46 00

FOG.

The limits of fog-belts to the westward of the fortieth meridian are shown on chart i by dotted shading. As compared with the chart for April, 1888, a slight extension of the southern limit of the Newfoundland fog-belt is shown, and the number of days during which fog prevailed in that region, seventeen, was five less than the aggregate number of foggy days reported for the preceding month. To the westward of the sixtieth meridian fog was reported for a total of twenty-seven days during May, while in April the foggy days numbered but fourteen. For the dates during which fog was reported over or near the Banks of Newfoundland, its development invariably attended the approach and passage of areas of low barometric pressure, while to the southward of Nova Scotia and along the American coast its presence, as a rule, accompanied the disturbed atmospheric conditions attendant upon the advance from the westward or southwestward of cyclonic areas.

The unusual prevalence of fog to the westward of the sixtieth meridian constitutes a noteworthy feature of May, 1888, and would seem to indicate abnormally large differences between the temperature of the ocean and that of the air currents brought into contact therewith.

The following are the limits of fog-areas on the north Atlantic Ocean during May, 1888, as reported by shipmasters:

Date.	Vessel.	Entered.			Cleared.		
		Lat. N.	Lon. W.	Time.	Lat. N.	Lon. W.	Time.
		° ′	° ′		° ′	° ′	
1	S. S. Waesland	40 23	67 15	3.40 p. m.	40 23	68 03	6.45 p. m.
1	Edith Godden	39 30	74 02	11.25 a. m.	Sandy	Hook.	
1	Nessmore	39 53	51 20	2.30 p. m.	39 54	49 55	4.40 p. m.
1	Lahn	42 14	50 48	7 p. m	42 07	52 12	10.50 p. m.
1–2	City of Berlin	41 35	45 16	8.59 p. m.	40 24	51 20	8.35 a. m.
2	Gallia	40 54	61 49	10 a. m.	40 51	63 08	2 p. m.
2–3	Slavonia	45 30	46 35	9 p. m.	43 34	51 24	5 p. m.
3	Buffalo	42 23	46 25	2 p. m	42 15	46 38	4 p. m.
3–4	Baumwall	49 16	43 40	3 p. m	48 00	49 50	6.30 p. m.
4	State of Nebraska	47 18	42 50		46 18	45 07	
4	Ems	43 35	48 24	6.30 a. m.	43 26	49 24	7.30 a. m.
4–5	Lake Ontario	50 08	43 34	9 a. m.	46 48	52 40	8.29 a. m.
5–6	Exeter City	41 03	66 30		40 11	71 50	
6	Pavonia	42 30	64 29	5 a. m	42 26	68 31	Midnight.
6–7	Aurania	Sandy	Hook.	9 p. m	41 00	59 18	4 p. m.
7	Siberian	42 29	56 44	4 a. m	42 30	54 45	Noon.
7	Devonia	41 35	60 18	1 a. m	41 13	63 26	2.13 p. m.
7–8	Rhein	37 34	73 26	8 p. m	Cape	Henry.	8 a. m.
7–8	Brooklyn City	42 50	51 00	7 p. m	43 25	48 40	7 a. m.
8	Stockholm City	44 15	45 20	5 a. m.	44 30	49 20	9.15 a. m.
9–10	Mareca	43 25	63 47	8 p. m	42 32	68 25	8.30 p. m.
9–11	Celtic	44 25	57 56	11 p. m	40 34	71 41	6 a. m.
11	Servia	41 23	61 46	2.05 p. m.	41 15	63 16	6 p. m.
11	Aller	41 15	65 03	9.40 a. m.	40 30	72 42	3.50 p. m.
11–12	Island	40 50	64 55	4 a. m	40 40	73 00	1 p.m.
12–13	Mentmore	39 22	69 30	3 p.m.	38 10	72 50	11 a. m.
13	Cyprus	36 20	74 50	7 a. m.	36 44	74 53	9.30 a. m.
13–14	Etruria	40 30	71 56	6.48 p. m.	40 30	63 39	10.15 a. m.
14–15	Scythia	43 32	48 05	8.52 p. m.	41 54	52 55	1.27 p. m.
15	Germanic	44 00	48 00	3 a. m.	43 30	51 10	11.30 a. m.
15	England	40 50	67 30	11.50 a. m.	40 41	68 05	4.30 p. m.
16	Rugia	41 48	59 10	4.30 p.m.	41 46	59 26	5.30 p. m.
17	Cephalonia	42 00	49 00	9.10 a. m.	42 00	50 00	Noon.
17	Norrona	43 16	65 23	3.45 p. m.	43 17	65 34	4.30 p. m.
18–19	Colima	48 24	62 14	10.55 p.m.	48 04	61 05	3.15 a. m.
18–19	State of Pennsylvania	47 40	47 03	3.10 p. m.	45 23	52 22	0.29 p. m.
19	Schiedam	40 39	69 03	4 a. m.	40 30	71 15	1 p. m.
20	Egypt	41 05	66 12	10.30 a. m.	40 53	67 42	4.30 p. m.
20	Victory	44 00	48 00		44 39	51 33	
23–24	Wyanoke	39 20	74 10	11.30 p. m.	37 00	75 55	2 p. m.
24	Bothnia	42 45	49 59	10 a. m.	42 44	50 22	11 a. m.
25	Trave	40 41	70 10	2 a. m.	40 30	73 20	10 a. m.
26	Virginian	43 53	48 48	9 p. m.	43 43	49 25	11.30 p. m.
26	Berrita	37 30	74 20	7 a. m.	39 15	74 20	Midnight.
27	Ludgate Hill	40 00	70 00		Sandy	Hook.	
27	Virginian	42 41	53 31	2.45 p. m.	42 39	53 45	3.45 p. m.
28	Faedrelandet	35 54	74 39	4 p. m	37 20	74 46	11 p. m.
29	Ailsa	39 00	73 56	7 a. m.	39 25	74 00	10 a. m.
30	Lahn	41 05	63 10	11 a. m.	41 03	63 30	12.45 p. m.
31	La Gascogne	42 05	49 35	8.42 p. m.			
31	Gallia	40 46	65 28	1 a. m	Scotland Lt.Sp.		2 p. m.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for May, 1888, is exhibited on chart ii by dotted isothermal lines. In the table of miscellaneous data are given the monthly mean temperatures, with the departures from the normal, for the various stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature, precipitation, and departures from the normal, show respectively the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal, and subtracting when above.

On the north Pacific coast and in the middle and northern plateau districts the month was warmer than the average, the excess over the normal temperature being slight, except in Washington Territory and Oregon, where it ranged from 2° to 5°. In southern California, and in all districts east of the Rocky Mountains, the month was colder than the average. The deficiencies of temperature was very slight in the Southern States, but in the northern districts they were quite marked, amounting to from 6° to 9° from Dakota eastward to the Lake region. On the Atlantic coast the deficiencies ranged from less than 1° in the south Atlantic states to about 4° at stations on the southern New England coast.

The following are some of the most marked departures from normal temperatures at Signal Service stations:

Above normal.		Below normal.	
	°		°
Walla Walla, Wash	5.8	La Crosse, Wis	9.3
Portland, Oregon	5.3	Saint Paul, Minn	9.2
Astoria, Oregon	4.4	Yankton, Dak	7.7
Roseburg, Oregon	4.1	Des Moines, Iowa	7.5
Spokane Falls, Wash	3.8	Milwaukee, Wis	7.4
Olympia, Wash	3.4	Omaha, Nebr	7.1
Fort Canby, Wash	2.1	Marquette, Mich	6.8

At Signal Service stations the absolute maximum temperature for the month, 107°, occurred at Fort McDowell, Ariz., on the 12th; absolute minimum, 6°.7, occurred on the summit of Pike's Peak, Col., on the 3d, the next lowest being 14°.4 at Saint Vincent, Minn., on the 17th. The highest monthly mean temperature, 78°.6, is reported from Rio Grande City, Tex., and the lowest, 21°.3, from Pike's Peak, Col., the next lowest being 42°.2 from Duluth, Minn.

The table of comparative maximum and minimum temperatures shows that the maximum temperatures of May, 1888, have been exceeded in past years at all stations. The minimum temperatures, however, were the lowest that have yet occurred in May at some stations, viz., Block Island, R. I., Charlotte, N. C., Knoxville, Tenn., Marquette, Mich., and Saint Vincent,

Minn., the length of record at these stations ranging from eight to eighteen years.

RANGES OF TEMPERATURE.

The monthly and the greatest and least daily ranges of temperature at Signal Service stations are given in the table of miscellaneous meteorological data. The monthly ranges were greatest, amounting to 60°, or more, over the northern and central plateau districts and the extreme northwest; they were least along the immediate coasts of the Gulf and Pacific, being generally less than 30°.

The following are some of the extreme monthly ranges:

Greatest.		Least.	
	°		°
Winnemucca, Nev	67.0	San Diego, Cal	18.0
Fort Klamath, Oregon	64.0	Key West, Fla	19.4
Saint Vincent, Minn	62.4	Cedar Keys, Fla	23.7
Lakeview, Oregon	61.0	Brownsville, Tex	24.4
Linkville, Oergon	60.6	Galveston, Tex	24.6
Fort Bidwell, Cal	59.9	Jupiter and Titusville, Fla	26.0

Table of comparative maximum and minimum temperatures for May.

State or Territory.	Stations.	For 1888.		Since establishment of station.				Length of record.
		Max.	Min.	Max.	Year.	Min.	Year.	
		°	°	°		°		Yrs.
Alabama	Mobile	85.2	54.0	98.0	1878	47.3	1883	18
Do	Montgomery	92.4	48.3	98.0	1875	44.0	1883	16
Arizona	Prescott	85.0	33.5	92.1	1886	26.0	1877	13
Do	Fort Apache	92.4	32.0	96.3	1886	29.0	1883	10
Arkansas	Fort Smith	88.0	44.0	97.9	1886	41.5	1885	6
Do	Little Rock	88.5	45.0	93.2	1886	43.8	1885	9
California	San Francisco	81.1	47.4	96.9	1887	45.0	1876, 1882	18
Do	San Diego	70.0	52.0	94.0	1879	45.4	1883	17
Colorado	Denver	85.0	31.5	92.0	1874	27.0	1872, 1873	17
Do	Montrose	81.2	32.2	89.5	1886	28.3	1887	3
Connecticut	New Haven	79.9	32.4	89.0	1880	30.5	1882	16
Do	New London	76.8	35.8	89.0	1881	32.0	1876, 1882	17
Dakota	Fort Buford	74.7	22.2	95.0	1880	20.0	1885	10
Do	Yankton	79.1	32.0	94.6	1886	24.0	1875	16
Dis. of Columbia	WashingtonCity	89.0	38.6	96.0	1880	33.5	1876	18
Florida	Jacksonville	93.0	56.5	98.5	1878	48.0	1877	17
Do	Key West	85.4	66.0	93.2	1881	63.0	1877	18
Georgia	Atlanta	88.0	44.3	91.0	1879	39.5	1883	10
Do	Savannah	90.6	52.5	98.0	1878	48.0	1877	18
Idaho	Boisé City	90.0	31.6	97.3	1887	26.1	1887	11
Illinois	Cairo	84.5	42.1	92.0	1874	37.0	1875	17
Do	Chicago	81.0	32.2	89.0	1874	27.0	1875	16
Indiana	Indianapolis	86.2	36.0	89.0	'74, '81, '87	31.0	1877	16
Indian Ter	Fort Sill	90.0	44.8	103.5	1886	41.5	1887	11
Iowa	Dubuque	78.5	30.5	94.0	1874	25.9	1885	15
Do	Des Moines	81.0	34.0	93.6	1880	27.8	1885	10
Kansas	Dodge City	84.3	39.0	98.0	1879, 1880	32.0	1884	14
Do	Leavenworth	82.8	36.5	94.0	1874	31.0	1875	17
Kentucky	Louisville	90.8	37.5	93.0	1881	36.0	1875, 1876	16
Louisiana	New Orleans	88.5	60.0	92.0	1877	56.0	1871, 1877	18
Do	Shreveport	89.5	51.8	101.2	1886	47.0	1876	16
Maine	Eastport	65.8	30.0	80.0	1877	29.0	1882	16
Do	Portland	66.6	32.3	94.0	1880	34.0	1873, 1876	17
Maryland	Baltimore	86.5	40.8	95.0	1881	34.0	1876	16
Massachusetts	Boston	77.0	35.0	97.0	1880	31.0	1882	18
Michigan	Marquette	75.7	21.8	92.0	1879	22.0	1875	14
Do	Grand Haven	77.6	30.0	86.0	1877	28.0	1875	16
Minnesota	Saint Vincent	76.8	14.4	96.0	1887	21.0	1882	8
Do	Saint Paul	77.5	28.6	94.0	1874	24.0	1875	16
Mississippi	Vicksburg	89.0	50.0	95.0	1874	46.0	1877	16
Missouri	Saint Louis	87.5	40.0	93.0	1874	32.0	1875	18
Montana	Ft. Assinaboine	76.7	30.8	94.7	1886	18.2	1885	8
Do	Helena	78.0	31.5	88.8	1886	21.9	1885	9
Nebraska	North Platte	85.3	31.8	94.0	1880	26.0	1885	14
Do	Omaha	84.0	36.7	93.0	1887	28.0	1875	16
Nevada	Winnemucca	90.0	23.0	95.9	1887	16.8	1887	10
New Jersey	Atlantic City	74.2	40.2	89.0	1880, 1881	33.0	1876, 1880	15
New Mexico	Santa Fé	76.5	33.5	89.0	1872	24.0	1880, 1887	16
New York	Buffalo	80.7	33.4	87.0	1876	29.0	1876	16
Do	New York City	82.1	40.7	94.0	1880	34.0	1876, 1880	17
North Carolina	Charlotte	94.0	40.0	94.4	1881	40.5	1883	10
Do	Wilmington	85.5	50.7	95.0	1878	38.0	1876	18
Ohio	Cincinnati	87.6	38.8	94.0	1874, 1875	35.0	1883	18
Do	Sandusky	84.0	36.9	92.0	1879	34.0	1880	10
Oregon	Portland	91.3	37.5	99.0	1887	33.0	1878	16
Do	Roseburg	93.0	35.7	102.0	1887	30.5	1886	11
Pennsylvania	Pittsburg	85.2	37.2	95.1	1887	27.0	1876	16
Do	Philadelphia	86.6	42.5	96.0	1880	36.0	1880	18
Rhode Island	Block Island	71.0	34.9	78.3	1881	36.0	1882	8
South Carolina	Charleston	87.0	51.8	94.0	1886	47.0	1876	16
Tennessee	Knoxville	86.6	36.1	94.0	1877	37.0	1880	18
Do	Memphis	88.4	46.0	96.0	1879	41.0	1883	16
Texas	Brownsville	88.3	63.9	99.0	1877	49.0	1877	13
Do	Fort Elliott	93.6	40.0	96.0	1886	35.0	1885	9
Utah	Salt Lake City	84.0	38.1	93.3	1887	30.7	1887	15
Virginia	Lynchburg	89.5	41.2	94.1	1887	37.0	1876	16
Do	Norfolk	90.0	44.1	98.0	1880	38.0	1876	18
Washington	Spokane Falls	91.5	34.9	94.9	1887	29.0	1881	8
Do	Olympia	88.0	34.0	88.8	1887	30.0	1882, 1886	11
Wisconsin	La Crosse	79.0	32.0	96.0	1874	29.0	1875	16
Do	Milwaukee	71.0	28.9	90.0	1874	25.0	1875	18
Wyoming	Cheyenne	78.0	27.0	88.0	1874	21.5	1886	16

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperatures for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for May, 1888; (4) the departures of the current month from the normal; (5) and the extreme monthly means for May during the period of observations and the year of occurrence:

State and Station.	County.	(1) Normal for the month of May.	(2) Length of record.	(3) Mean for May, 1888.	(4) Departure from normal.	(5) Extreme monthly mean temperature for May.			
						Highest.		Lowest.	
						Am't.	Year.	Am't.	Year.
Arkansas.		°	Years	°	°	°		°	
Lead Hill	Boone	68.3	6	66.9	−1.4				
California.									
Sacramento	Sacramento	64.3	22	61.8	−2.5	70.5	1875	59.7	1879
Florida.									
Merritt's Island	Brevard	76.4	5	75.2	−1.2	79.2	1884	75.2	1888
Illinois.									
Golconda	Pope	68.7	10	65.7	−3.0				
Peoria	Peoria	64.0	32	61.5	−2.5				
Prairieville	Lee	58.1	16	56.1	−2.0				
Riley	McHenry	57.6	27	51.7	−5.9				
Indiana.									
Blue Lick	Clark	64.7	11	61.7	−3.0				
Logansport	Cass	63.9	34	60.9	−3.0				
Vevay	Switzerland	65.4	21	62.2	−3.2	71.1	1880	61.2	1869
Iowa.									
Cresco	Howard	57.1	16	49.9	−7.2				
Independence	Buchanan	60.0	12	52.0	−8.0				
Monticello	Jones	59.8	34	53.8	−6.0	67.8	1870	52.1	1860
Kansas.									
Independence	Montgomery	66.5	17	64.6	−1.9				
Lawrence	Douglas	65.3	21	62.1	−3.2	70.6	1880	60.3	1882
Wellington	Sumner	64.9	10	63.6	−1.3	71.1	1880	58.2	1882
Louisiana.									
Grand Coteau	Saint Landry	74.0	6	74.7	+0.7				
Maine.									
Gardiner	Kennebec	53.4	52	49.9	−3.5	57.6	1854	49.2	1882
Maryland.									
Cumberland	Alleghany	61.8	16	60.2	−1.6	67.0	1880	57.5	1882
Massachusetts.									
Somerset	Bristol	58.2	18	57.2	−1.0				
Michigan.									
Thornville	Lapeer	59.3	12	54.6	−4.7				
Kalamazoo	Kalamazoo	58.8	13	54.3	−4.5				
Adrian	Lenawee	57.9	11	55.4	−2.5				
Nevada.									
Carson City	Ormsby	57.3	9	56.7	−0.6	59.6	81, '86	54.2	1883
New Jersey.									
South Orange	Essex	60.2	18	57.4	−2.8	66.4	1880	53.0	1882
New York.									
Palermo	Oswego	51.6	35	52.2	+0.6	60.7	1880	47.5	1867
Ohio.									
Wauseon	Fulton	59.0	18	55.2	−3.8	64.3	1880	52.2	1882
Oregon.									
Albany	Linn	56.8	10	60.2	+3.4	60.2	1888	51.4	1883
Eola	Polk	54.2	18	59.1	+4.9				
Pennsylvania.									
Dyberry	Wayne	54.9	22	53.5	−1.4	64.1	1880	48.4	1882
Grampian Hills	Clearfield	56.4	25	55.6	−0.8				
Wellsborough	Tioga	56.9	10	54.9	−2.0	63.2	1887	50.5	1882
South Carolina.									
Statesburg	Sumter	70.1	8	69.7	−0.4	73.8	1881	65.9	1885
Tennessee.									
Milan	Gibson	67.0	6	67.0	0.0	83.0	1887	55.0	1885
Texas.									
New Ulm	Austin	74.4	16	72.6	−1.8	77.4	1879	72.0	1885
Vermont.									
Strafford	Orange	56.5	14	53.7	−2.8	63.0	1887	50.5	1882
Virginia.									
Bird's Nest	Northampt'n	65.0	19	63.6	−1.4	73.7	1880	61.6	1873
Variety Mills	Nelson	63.8	11	63.0	−0.8	68.0	1880	60.2	1877
Wytheville	Wythe	61.1	25	60.5	−0.6	65.7	1880	57.0	1869
West Virginia.									
Helvetia	Randolph	58.6	12	57.8	−0.8	63.2	1887		

FROST.

Frosts occurred most extensively on the 16th and 17th; after the 23d they were recorded in but few states. In Dakota, Iowa, and Minnesota frosts were reported on from 19 to 25 days, and in Illinois, Indiana, Michigan, Montana, Nebraska, Nevada, New York, Ohio, Pennsylvania, Vermont, Wisconsin and Wyoming from 9 to 15 days. In California, Arizona, New Mexico, and in the Central and Southern States they were reported as follows:

Alabama.—New Market, 2d, 15th.

Arizona.—Fort Apache, 21st, 26th, 27th; Whipple Barracks, 6th, 22d to 25th, 27th, 28th.

Arkansas.—Lead Hill, 1st.

California.—Eureka, 11th; Fort Bidwell, 2d.

Georgia.—Atlanta, 15th.

Kentucky.—Elkin, 14th; Frankfort and Shelbyville, 15th; Louisville, 14th to 16th.

Maryland.—Barren Creek, 3d; Mount Saint Mary's, 2d, 3d, 17th.

New Mexico.—Las Vegas, 7th, 19th, 27th, 28th, 29th; Santa Fé, 5th, 7th, 27th, 28th, 29th.

North Carolina.—Charlotte, Lenoir, Monroe, and Salem, 15th; Marion, 2d.

South Carolina.—Abbeville, Black's, and Spartanburg, 15th; Cedar Springs, 15th, 16th; Winnsborough, 17th.

Tennessee.—Ashwood, 2d, 15th; Chattanooga, Knoxville, and Nashville, 15th.

Utah.—Brock's Ranch, 8th, 9th.

Virginia.—Bird's Nest, 3d; Lynchburg and Wytheville, 15th; Dale Enterprise, 15th, 17th.

West Virginia.—Middlebrook, 2d, 3d, 15th, 17th; White Sulphur Springs, 6th; Hartmansville, Helvetia, and Parkersburg, 17th.

The following are reports of injury to fruit, etc., by frosts during May:

Springfield, Mo.: the frost on the morning of the 1st caused slight damage to vegetation.

Galesburg, Knox Co., Ill.: great damage was done by the freeze on the night of the 12–13th.

Monmouth, Warren Co., Ill.: ice formed to a thickness of three-fourths of an inch on night of 12–13th; vegetables were killed.

Yankton, Dak.: the frost of the 12th was very injurious to early vegetables.

Wytheville, Wythe Co., Va.: early vegetables, fruit, wheat, corn, and oats were injured by frost on the night of the 14–15th.

Lynchburg, Va.: frost on the 14–15th caused injury to fruit, and in some places to tobacco plants.

Abingdon, Washington Co., Va.: frost on the night of the 14–15th caused great damage to fruit, vegetables, and corn.

Marion, Smyth Co., Va.: fruit and vegetables were seriously injured by frost on the night of the 14–15th.

Noblesville, Hamilton Co., Ind.: fruit and vegetables were killed by the severe frosts of the 15th.

Lawrence, Douglas Co., Kans.: the hoar frosts on the 14th and 19th were quite severe, injuring tender vegetation in some localities.

Knoxville, Tenn., 18th.: reports from the tobacco growing counties of western North Carolina state that about two-thirds of the young tobacco plants were killed by recent frosts, and that wheat and vegetables were seriously injured in the mountain districts.

Louisville, Ky.: reports state that the frost of the 16th caused great damage to crops in the western portion of the state.

Youngstown, Mahoning Co., Ohio: ice and heavy frost formed on morning of the 17th, damaging all early fruit.

Uniontown, Fayette Co., Pa.: fruit and corn were much damaged by the frost on the 17th.

Johnstown, Cambria Co., Pa.: the frost of the 17th caused considerable damage.

Greenville, Mercer Co., Pa.: heavy frost occurred on the 17th, freezing plants. In the vicinity of Sharon, in this county, ice formed to a thickness of one-fourth inch, and, as many varieties of fruit trees were in full bloom, it was thought that much damage would result.

Pittsburg, Pa.: the frost on the 17th caused damage to gardens in this vicinity.

Detroit, Mich., 18th: it is reported that the recent frosts have caused serious damage to fruit trees.

Sandusky, Ohio: farmers report that fruit and vegetables were considerably injured by the frost of the 20th.

Wellsborough, Tioga Co., Pa.: on the 20th ice formed to a thick ness of one inch and the ground froze to a depth of four inches; fruit was seriously injured.

TEMPERATURE OF WATER.

The following table shows the temperature of the sea-water for May, 1888, observed, under conditions as given, at the harbors of the several stations; the monthly range of water temperature; the average depth at which the observations were made, and the mean temperature of the air:

Station.	Temperature at bottom.				Mean temperature of air at the station.	Average depth of water in feet and tenths.
	Max.	Min.	Range.	Monthly mean.		
	°	°	°	°	°	
Canby, Fort, Wash	58.0	54.0	4.0	56.4	53.1	13.3
Cedar Keys, Fla	84.2	76.2	8.0	80.0	75.3	8.4
Charleston, S. C	78.5	63.0	15.5	72.7	72.3	34.4
Eastport, Me	40.7	37.0	3.7	39.0	45.3	15.6
Galveston, Tex	82.0	75.0	7.0	78.2	74.8	14.8
Key West, Fla*	87.5	75.0	12.5	81.8	78.5	18.0
New York City	59.4	47.0	12.4	53.6	57.9	14.9
Pensacola, Fla	79.5	71.8	7.7	75.7	73.3	18.4
Portland, Me	48.5	41.9	6.6	44.4	48.8	15.9
Portland, Oregon	67.5	54.8	12.7	61.1	62.3	57.7

COTTON REGION REPORTS.

In the accompanying table are given for May, 1888, means of the maximum and minimum temperatures, and the average rainfall in the cotton regions, together with normals computed from similar observations of former years:

Temperature and rainfall data for the cotton districts, May.

Districts.	Rainfall.			Temperature.							
				Maximum.			Minimum.			Extremes for May, 1888.	
	Average for May of five preceding years.	Average for May, 1888.	Departures.	Mean for May of five preceding years.	Mean for May, 1888.	Departures.	Mean for May of five preceding years.	Mean for May, 1888.	Departures.	Max.	Min.
	Inches	*Inches*	*Inches.*	°	°	°	°	°	°	°	°
New Orleans	5.19	4.75	− 0.44	84.6	84.7	+ 0.1	62.8	61.1	− 1.7	94	45
Savannah	2.98	5.82	+ 2.84	85.9	86.1	+ 0.2	62.3	63.4	+ 1.1	97	41
Charleston	3.28	7.56	+ 4.28	83.9	83.9	0.0	59.5	62.3	+ 2.8	94	46
Atlanta	2.95	6.03	+ 3.08	81.7	81.1	− 0.6	57.1	60.1	+ 3.0	96	37
Wilmington	3.93	6.39	+ 2.46	81.3	80.0	− 1.3	56.9	59.9	+ 3.0	95	40
Memphis	4.13	2.85	− 1.28	80.6	80.0	− 0.6	57.2	58.0	+ 0.8	96	34
Galveston	6.13	6.22	+ 0.09	84.5	83.4	− 1.1	62.4	63.5	+ 1.1	95	44
Vicksburg	5.42	3.54	− 1.88	83.1	83.4	+ 0.3	61.2	61.8	+ 0.6	92	46
Montgomery	3.16	4.07	+ 0.91	84.2	83.4	− 0.8	59.6	61.0	+ 1.4	96	43
Augusta	3.04	6.25	+ 3.21	84.0	82.2	− 1.8	59.0	60.5	+ 1.5	96	38
Little Rock	5.49	4.07	− 1.42	80.5	81.3	+ 0.8	56.3	57.1	+ 0.8	95	32
Mobile	3.92	3.33	− 0.59	83.6	83.7	+ 0.1	60.5	61.2	+ 0.7	96	44

The rainfall was slightly below the average in the districts of New Orleans, Memphis, Vicksburg, Little Rock, and Mobile; it was in excess of the average in the remaining districts, the departures being very large in those on the south Atlantic coast.

The minimum temperatures were generally slightly above the average. The maximum temperatures differed very little from the average, there being a slight excess in some districts and deficiencies in others.

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for May, 1888, as determined from the reports of about one thousand stations, is exhibited on chart iv. In the table of miscellaneous meteorological data are given, for each Signal Service station, the total precipitation, with the departures from the normal. The figures opposite the names of the geographical districts in columns for mean temperature, precipitation, and departures from the normal, show respectively the average for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal, and subtracting when above.

In the upper lake region, Ohio Valley and Tennessee, and in the west Gulf states the precipitation for May was about normal. In the northern slope, southern plateau, upper Mississippi and Missouri valleys, and in the states bordering on the Atlantic, with the exception of Florida, the precipitation was above the normal, the excess ranging from 35 to 60 per cent. in all of the districts named, with the exception of the southern plateau, where it amounted to 12 per cent. On the Pacific coast, in the northern and central plateau districts, middle and southern slopes, lower lake region, and Florida the precipitation was below the average. In Florida and the lower lakes about two-thirds of the average amount of rain fell; in other districts where deficiencies occurred the proportion of the average rainfall was as follows: Northern and middle plateaus and middle and southern slopes, about three-fourths; north Pacific coast, about one-fourth; middle Pacific coast, slightly less than two-thirds; south Pacific coast, about one-third. In nearly all districts where deficiencies occurred in the previous month the rainfall of May was excessive, and in those districts where it was deficient in April there was an excess in May, the exceptions being Florida, the northern and middle plateau, and Pacific coast districts, where marked deficiencies occurred in both months.

Chart v of this REVIEW is the first of a series of four preliminary charts which it is proposed to publish for the purpose of showing the normal rainfall for the months of April, May, June, and July, the four months during which the staple crops of the country are grown or harvested. The chart issued with this REVIEW is for the month of May, and is based upon normals of two hundred and thirty-five Signal Service and voluntary stations. One hundred and eighty-seven of the normals used are for eighteen years, and for the most part are based on actual observations covering the entire period, but in a few cases where the records were broken, they were completed by interpolation from data at neighboring stations. Forty-eight stations supply normals of fifteen years, and while nearly all have been determined from actual observations, some have been completed by interpolation, but in no case has the period for which the rainfalls were interpolated exceeded three years.

The data on which these charts is based will probably be published in tabular form in the July REVIEW.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for a series of years; (2) the length of record during which the observations have been taken, and from which the average has been computed; (3) the total precipitation for May, 1888; (4) the departures of the current month from the average; (5) and the extreme monthly precipitation for May during the period of observations and the year of occurrence:

State and station.	County.	(1) Average for the month of May.	(2) Length of record.	(3) Total for May, 1888.	(4) Departure from average.	(5) Extreme monthly precipitation for May.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Lead Hill	Boone	6.45	6	8.95	+2.50	.....	.....	.....	.....
California.									
Sacramento	Sacramento	0.50	22	0.39	−0.11	2.90	1883	0.00	1873
Florida.									
Merritt's Island	Brevard	3.82	11	2.46	−1.36	8.71	1879	0.88	1886
Illinois.									
Golconda	Pope	4.67	10	2.99	−1.68	.....	.....	.....	.....
Peoria	Peoria	3.80	32	6.72	+2.92	.....	.....	.....	.....
Riley	McHenry	3.26	27	4.48	+1.22	.....	.....	.....	.....
Indiana.									
Logansport	Cass	3.83	34	5.55	+1.72	8.23	1880	1.20	1862
Vevay	Switzerland	3.45	21	2.51	−0.94	8.65	1882	0.52	1874
Iowa.									
Cresco	Howard	3.22	16	7.34	+4.12	.....	.....	.....	.....
Independence	Buchanan	3.93	12	5.54	+1.61	.....	.....	.....	.....
Monticello	Jones	3.85	34	6.10	+2.25	7.97	1858	0.76	1874
Kansas.									
Independence	Montgomery	4.24	16	4.82	+0.58	10.16	1878	0.88	1874
Lawrence	Douglas	4.05	21	1.97	−2.08	7.12	1873	1.12	1887
Wellington	Sumner	4.89	10	4.66	−0.23	9.37	1881	0.88	1886
Louisiana.									
Grand Coteau	Saint Landry	6.75	6	7.41	+0.66	.....	.....	.....	.....

Deviations from average precipitation—Continued.

State and station.	County.	(1) Average for the month of March.	(2) Length of record.	(3) Total for May, 1888.	(4) Departure from average.	(5) Extreme monthly precipitation for May.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Maine.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Gardiner	Kennebec	3.82	50	2.48	−1.34	9.59	1868	0.36	1852
Maryland.									
Cumberland	Alleghany	2.81	16	3.47	+0.66	4.73	1883	0.30	1875
Massachusetts.									
Somerset	Bristol	3.29	18	5.15	+1.86	.....	.....	.....	.....
Michigan.									
Thornville	Lapeer	3.19	12	2.78	−0.41	.....	.....	.....	.....
Kalamazoo	Kalamazoo	4.03	13	4.92	+0.89	.....	.....	.....	.....
Adrian	Lenawee	3.90	11	2.70	−1.20	.....	.....	.....	.....
Nevada.									
Carson City	Ormsby	0.39	9	1.05	+0.66	1.05	1888	0.04	1880
New Jersey.									
South Orange	Essex	3.03	18	6.46	+3.43	6.46	1888	0.93	1887
New York.									
Palermo	Oswego	2.77	35	1.17	−1.60	6.90	1867	0.30	1870
Ohio.									
Wauseon	Fulton	3.91	16	3.36	−0.55	6.25	1880	1.14	1877
Oregon.									
Albany	Linn	2.44	10	1.00	−1.44	5.70	1879	0.89	1884
Eola	Polk	1.93	18	1.00	−0.93	.....	.....	.....	.....
Pennsylvania.									
Dyberry	Wayne	2.83	19	3.86	+1.03	5.19	1882	0.36	1875
Wellsborough	Tioga	3.72	17	4.58	+0.86	.....	.....	.....	.....
South Carolina.									
Stateburg	Sumter	3.63	8	6.68	+3.05	6.68	1888	1.24	1882
Tennessee.									
Milan	Gibson	3.44	6	1.90	−1.54	4.98	1884	1.90	1888
Texas.									
New Ulm	Austin	5.82	16	7.74	+1.92	.....	.....	.....	.....
Vermont.									
Strafford	Orange	3.02	14	3.60	+0.58	4.55	1884	0.40	1887
Virginia.									
Bird's Nest	Northampton	3.12	19	4.75	+1.63	7.85	1885	0.50	1879
Wytheville	Wythe	3.66	25	3.73	+0.07	7.30	1873	0.51	1875
West Virginia.									
Helvetia	Randolph	4.50	12	5.85	+1.35	7.15	1882	2.75	1876

HAIL.

Descriptions of the severe hail storms of the month are given under "Local storms." In addition to those given under that heading, hail is reported to have fallen in the various states and territories as follows: 1st, Dak., Mont., Nev., Wyo. 2d, Dak., Kans., Nebr., Tex., Wis. 3d, Ark., Iowa., Kans., Mo., Mont., Tex., Wis. 4th, Mont., Nebr., S. C. 5th, Ariz., Colo., Fla., N. Mex., Wyo. 6th, N. Mex., Tex. 7th, Iowa., Mo., Ohio. 8th, Nebr., Ohio. 9th, Kans., N. Y., Ohio, Tex. 10th, Ala., Dak., Iowa, Kans., N. Y., Tex. 11th, Iowa, Mont. 12th, Dak., N. C., S. C., Va. 13th, Ark., Mo. 14th, Cal., Kans., Nev., Tex., Vt., W. Va. 15th, Colo., Ind. T., Kans., Mo., Nebr., N. Y., Pa., Tenn., Tex. 16th, Ark., N. Mex., N. Y. 17th, Colo., Iowa, Kans., Tex. 18th, N. Mex. 19th, Wash. 20th, Colo., Kans., La., Nebr. 21st, Colo., Iowa, Kans., Nebr., Tex., Wyo. 22d, Colo., Ind. T., Kans., Tex., Wyo. 23d, Ark., Colo., Kans., Mo., Nebr., Oregon, Tex., Wyo. 24th, Ark., Colo., Kans., La., Miss., Mo., Nev., Tenn., Tex., Wis., Wyo. 25th, Cal., Fla., Kans., Nebr., Ohio, Tex., Wyo. 26th, Ark., Colo., Ind. T., Kans., Nebr., Oregon. 27th, Ark., Dak., Ill., Ind., Iowa, Kans., Mo. Ohio, Wyo. 28th, Dak., Ill., Iowa., N. Y., Ohio, Pa., S. C. 29th, Colo., N. J., N. Y., Oregon, Va., Wyo. 30th, Colo., Nebr., N. Mex. 31st, Colo.

SNOW.

Snow fell on the 1st in the Lake region; on the 2d in the extreme northwest and New England; on the 3d in the Missouri Valley and upper lake region; on the 13th, 14th and 15th in the Lake region. The most southerly station reporting snow east of the Rocky Mountains was Terre Haute, Ind., where it occurred on the 14th. In the central and northern Rocky Mountain regions snow fell on numerous dates, being most general on the 2d. In Arizona snow occurred at Whipple Barracks on the 1st and 4th, and at Fort Apache on the 24th. The last date on which snow fell at stations east of the Rocky Mountains was the 18th, at Marquette, Mich.

MONTHLY SNOWFALLS (in inches and tenths).

The following monthly snowfalls have been reported:

California: Summit, 4. *Colorado:* Georgetown, 16. *Dakota:* Fort Totten and Leech Farm, trace. *Illinois:* Lake Forest,

1st; Cedarville, Lacon, and Philo, trace. *Indiana:* Angola, 0.4; Delphi, Fortville, La Grange, Marengo, Seymour, Rockville, trace. *Massachusetts:* Boston and Dudley, trace. *Michigan:* Hillman, 6; Calumet, 5; Harrisville, 4; Lathrop, 2.3; Fletcher, 2; Charlevoix, 1; Sault Sainte Marie, 0.7; Maple Hill, 0.5; Mottville and Pulaski, 0.1; Concord, Ionia, and Port Huron, trace. *Minnesota:* Pine River Dam and Delano, 2; Minneapolis, 1.5; Saint Vincent, trace. *Nebraska:* Hay Springs, 6. *New Hampshire:* Manchester, 0.1. *Pennsylvania:* Ligonier, 1; Wellsborough, trace. *West Virginia:* Middlebrook, 1. *Wisconsin:* Embarras, 0.1; Green Bay, trace. *Wyoming:* Fort Washakie, trace.

SLEET.

Sleet fell during the month on the several dates as follows: 2d and 3d, Michigan; 11th, Nebraska; 14th, Michigan and Wisconsin; 15th, New York and Pennsylvania; 17th, Iowa and Montana; 23d, 24th, and 30th, Colorado.

EXCESSIVE PRECIPITATION IN MAY.

Table showing for the month of May monthly rainfalls of 10 inches, or more (in states where monthly rainfalls did not reach 10 inches the station reporting the maximum amount is given); rainfalls of 2.50 inches, or more, in any 24 consecutive hours; and rainfalls equaling or exceeding one inch in one hour.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time	Amt.
Alabama.		*Inches.*			*Inches*			h. m.	*Inches*
Fort Deposit			1885	30	3.00				
Greenville	1885	14.45	1885	6	2.80				
Do			1885	21	2.80				
Do			1885	30	5.85				
Livingston			1887	26	2.65				
Mobile			1873	6	2.95	1879	5	0 20	1.64
Do			1873	18	3.41	1888	7	3 30	3.38
Do			1876	7	3.69				
Do			1882	31	2.72				
Do			1883	29	5.62				
Do			1888	7	3.38				
Montgomery	1873	10.25	1873	1	3.47	1888	19	0 20	0.82
Do			1880	21	3.33				
Do			1881	13–14	3.63				
Opelika			1887	27	2.73				
Do			1888	20	3.30				
Arizona.									
Fort Thomas	1887	2.73				1887	25	1 35	2.25
Arkansas.									
Dallas	1888	10.10							
Hot Springs			1888	27–28	5.52	1888	24	0 50	1.00
Do						1888	27	0 30	1.06
Judsonia			1878	2	2.75				
Lead Hill			1888	17	3.25				
Little Rock	1882	15.91	1882	7	4.19				
Do			1882	9–10	6.33				
Madison			1884	22	2.50				
Malvern			1885	26	4.00				
Do			1888	28	4.89				
Monticello			1883	30	3.05				
Do			1885	26	3.10				
Prescott			1884	3	4.00				
Pine Bluff			1888	28	2.50				
Russellville			1887	3	2.55				
Texarkana			1884	19	2.56				
California.									
Red Bluff	1883	2.96							
Colorado.									
Colorado Springs			1874	29	2.92				
Denver			1876	21–22	6.70				
Pike's Peak	1882	12.34	1879	11–12	2.54				
Do			1882	7–8	4.31				
Ula	1875	10.43	1875		4.30	1875		1 00	1.20
Connecticut.									
Canton	1868	18.00							
New Haven			1874	15–16	2.63				
Do			1883	22	3.32				
New London			1883	22	2.84	1888	29	0 30	0.50
Dakota.									
Deadwood	1883	10.33	1874	2	4.55				
Do			1882	7–8	3.33				
Do			1883	17–18	2.77				
Do			1883	18–19	2.62				
Morristown			1881	16–17	3.40				
Pembina, Fort			1880	26	2.64				
Philip Kerney, Fort	1868	11.10	1868	30–31	3.00				
Randall, Fort			1872	15	6.13				
Rapid City	1883	10.02							
Sully, Fort			1874	1–2	4.55				
Webster						1885	20	1 05	1.34
Do						1886	8	0 45	1.84
Yankton			1888	27	2.52				
Delaware.									
Delaware, Fort	1865	11.40	1867	13–14	2.90				
Dover			1876	9	2.90				

Table showing for the month of May, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
District of Columbia.		*Inches.*			*Inches*			h. m.	*Inches*
Washington City	1886	10.60							
Florida.									
Archer						1888	5	0 35	1.00
Do						1888	6	0 15	0.35
Barrancas, Fort	1880	10.98	1880	26	4.23				
Biscayne			1877	6	3.00				
Cedar Keys			1887	23	3.04	1882	24	1 00	1.00
Daytona			1874	3	2.87				
Jupiter			1888	9–10	3.18				
Jacksonville			1887	21–22	2.72	1874	4	1 00	1.18
Do						1875	29	1 42	2.40
Homeland						1888	30	0 50	1.50
Key West			1871	31	3.17	1874	16	1 30	1.50
Do			1877	14–15	2.55				
Do			1880	10–11	3.11				
Do			1882	25–26	3.53				
Do			1883	11	4.85				
Mayport			1880	3–4	5.53				
Saint Augustine, Fort			1879	7	3.80				
Tallahassee	1888	10.40	1888	20	6.30				
Georgia.									
Athens			1886	29	2.80				
Atlanta			1880	21–22	2.64				
Do			1886	18	2.77				
Do			1888	20	3.33				
Augusta			1886	19–20	2.66				
Do			1888	20–21	2.83				
Bainbridge			1887	1	2.70				
Columbus			1880	22	9.92				
Covington			1883	1	3.55				
Dahlonega						1874	31	0 30	1.40
Forsyth						1887	11	0 30	1.10
Gainesville			1886	19	2.60				
Griffin			1886	19	2.61				
Macon			1887	19	2.95				
Milan			1888	19	3.55				
Quitman						1882	31	1 00	1.00
Saint Mary's			1877	27–28	3.10				
Savannah			1886	30	2.62	1885	30	1 05	1.29
Thomasville	1880	10.81							
Toccoa			1886	19	3.96				
Waynesborough			1887	12	2.85				
Idaho.									
Lewiston	1885	3.02							
Illinois.									
Anna						1880	9	1 00	1.21
Augusta			1875	20–21	3.65				
Cairo			1882	8–9	3.95				
Chicago			1873	1–2	2.82	1888	28	0 19	0.75
Do			1879	25	2.77				
Do			1883	9–10	3.05				
Collinsville						1888	23	0 12	1.70
Geneseo			1880	26	3.50				
Gibson			1888	24	3.50				
Griggsville			1884	16	2.67				
Havanna			1875	1	2.70				
Hennepin			1878	29–30	2.90				
Hoopeston			1888	27	2.70				
Louisville			1875	22	3.90				
Do			1876	20	4.00				
Do			1880	9	2.70				
McLeansborough			1882	8–9	2.50				
Mahomet			1888	27	2.77				
Mount Sterling			1880	8	3.20				
Pana			1888	18	3.50				
Pekin			1888	27	3.50				
Peoria	1858	10.73	1880	8	3.94				
Rock Island			1866	26–27	2.70				
Do			1876	18	3.20				
Sandwich			1874	3	3.88				
Do			1876	28–29	2.88				
Springfield	1882	10.59	1880	8	2.66	1888	7	1 10	1.88
Do			1882	5	3.35	1888	27	1 06	1.15
Do			1888	27	2.54				
Winchester			1888	26	2.50				
Indiana.									
Arlington			1879	25–26	4.75				
Fort Wayne			1877	20	2.50				
Indianapolis	1880	8.22	1876	6	3.31	1879	26	1 00	1.00
Do			1880	21	2.69	1882	4	1 00	1.00
Do						1888	27	1 00	1.25
Laconia			1880	30	2.78				
Montgomery			1880	21	3.33				
New Harmony			1880	21	3.33				
Saint Menands Abbey			1880	20–21	4.00				
Do			1880	29	4.50				
Wabash			1880	21	3.20				
Indian Territory.									
Gibson, Fort			1878	22	2.52				
Reno, Fort	1885	9.84	1884	15	2.90				
Sill, Fort			1871	30	3.53				
Do			1873	16–17	2.75				
Do			1875	22–23	4.50				
Do			1876	14–15	3.20				
Do			1880	26	2.76				
Iowa.									
Albion			1878	31	3.00	1878	30	3 00	3.00
Do			1882	5	2.50				
Cedar Rapids			1882	4–5	3.25				
Clinton			1879	31	2.50	1887	21	0 45	1.40
Clarinda			1888	26–27	3.15				

Table showing for the month of May, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Iowa—Continued.		*Inches.*			*Inches*			*h. m.*	*Inches*
Corydon						1886	3	2 00	2.00
Council Bluffs			1875	31	5.05				
Cromwell	1888	10.85	1888	11	2.56	1888	11	2 00	2.56
Davenport			1876	20	2.79	1888	3	0 10	0.50
Denmark						1880	20	1 00	1.75
Des Moines			1879	30	2.62	1879	30	1 00	1.00
Do			1882	4–5	2.81				
Do			1883	8–9	2.85				
Dubuque						1876	29	1 00	1.00
Elkader						1886	13	1 00	1.18
Fairfield	1882	10.02	1882	5	3.12	1888	28	1 30	1.39
Fort Madison	1882	10.50				1886	9	1 00	1.00
Glenwood			1880	25	2.50	1878	29	4 00	6.00
Glenwood Mills			1878		6.00				
Keokuk			1875	20	3.83				
Logan	1877	11.00	1878	29	2.50				
Mount Pleasant	1882	10.63							
Nashua			1880	12–13	4.00	1880	13	3 00	3.00
Do			1880	23	3.00				
Newton			1878	1	3.00	1881	13	1 30	1.83
Do						1881	27	0 45	1.12
Osage			1880	23–24	5.40				
Smithland	1888	11.20	1888	21	3.40	1879	25	1 00	1.00
Tabor			1878	29	4.16				
Kansas.									
Allison			1884	21–22	2.86				
Clay Centre			1882	26	3.00	1882	26	3 00	3.00
Do			1882	27	3.02				
Dodge City	1881	12.82	1878	21	3.24				
Do			1883	16–17	3.65				
East Norway			1888	26–27	2.60				
Ellinwood	1877	10.10	1877	17–18	5.03				
Grainfield			1888	6	3.00				
Hays, Fort						1870	19	1 05	1.75
Independence	1878	10.06	1878	17–18	2.58				
Larned, Fort			1875	17–18	2.50	1873	12	1 00	1.90
Do			1877	17–18	3.80				
Lawrence			1883	13	3.50	1883	13	1 45	2.00
Leavenworth, Fort			1867	15–16	3.07				
Do			1869	26	2.50				
Do			1870	30	4.38				
Do			1883	24–25	2.80				
Do			1884	17	2.90				
Leavenworth			1876	5–6	2.50	1880	25	1 35	1.79
Do			1880	25–26	2.61	1886	11	0 50	1.80
Do			1888	22–23	2.60	1888	10	1 00	1.46
Manhattan			1877	20	3.00	1888	26	0 30	1.00
Oberlin			1888	7	2.80				
Pretty Prairie			1883	16–17	3.58				
Riley, Fort			1885	13	2.70	1885	27	1 00	1.40
Do						1885	13	0 45	2.70
Do						1885	14	0 20	1.50
Do						1886	11	0 45	1.28
Do						1887	16	1 00	2.15
Russell Station			1888	5	3.00				
Topeka			1877	11	2.94				
Sedgwick	1877	16.38	1877	12	4.50	1877	12	2 50	4.50
Do			1877	30–31	3.50				
Wakeville			1879	30	4.00				
Wallace, Fort			1874	22–23	9.30				
Do			1880	14	4.00				
Wellington						1888	17	1 00	1.75
Kentucky.									
Louisville						1872	27	1 00	1.32
Do						1875	9	1 05	1.22
Louisiana.									
Alexandria			1888	30	4.17				
Cheneyville	1884	13.01	1884	20	2.95				
Minden			1884	2	2.77				
Do			1884	22	3.50				
Monroe			1884	22	2.94				
New Iberia			1883	26	3.00				
New Orleans	1873	18.68	1873	5–6	3.98	1873	20	1 00	1.47
Do			1873	20	3.39				
Do			1873	27–28	4.49				
Do			1876	7–8	4.09				
Do			1878	19	3.54				
Shreveport	1884	14.47	1872	23–24	3.21	1872	25	0 50	1.61
Do			1876	6	7.37				
Do			1881	8	2.70				
Do			1884	21	5.45				
Vermillion			1884	20	3.13				
Whiteville	1884	11.34	1883	10	2.81				
Do			1883	26	2.82				
Maine.									
Bar Harbor			1888	16	2.99				
Eastport	1881	13.22							
Lisbon	1868	11.20							
Perry	1865	11.83							
Prebble, Fort	1868	11.08							
Steuben	1868	10.05							
Maryland.									
Baltimore			1886	7	2.99				
Emery Grove			1879	15	5.00	1879	15	3 00	5.00
Fallston			1885	7	2.50				
McHenry, Fort			1876	15	3.02	1882	28	2 15	2.50
Do			1886	7–8	3.80				
Mount Saint Mary's			1882	28	2.50				
Saint John's Church	1881	12.30							
Sandy Springs			1879	16	4.28				
Woodstock College			1877	21	3.10	1878	19	0 52	2.00

Table showing for the month of May, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Maryland—Continued.		*Inches.*			*Inches*			*h. m.*	*Inches*
Woodstock College			1879	19	3.20				
Do			1886	7–8	3.01				
Massachusetts.									
Boston			1883	22	3.00				
Independence, Fort	1877	10.80	1864	2–3	4.44				
Do			1875	1–2	3.10				
Nantucket			1888	25	2.74	1887	28	1 00	1.00
Rowe						1881	15	1 30	1.90
Michigan.									
Alpena			1876	14–15	2.58				
Berlin			1888	26	3.30				
Berrien Springs			1888	28	3.04				
Buchanan			1888	28	2.83				
Coldwater	1883	10.75	1880	22	3.70				
Detroit						1875	9	1 00	1.00
Kalamazoo						1881	31	1 20	1.85
Lansing			1880	21	2.73				
Niles			1880	10	2.80				
Do			1880	22	3.35				
Northport	1884	19.85	1852	10–11	3.25				
Do			1882	30–31	2.75				
Do			1884	2	4.75				
Do			1884	3–4	3.90				
Do			1884	13	4.60				
Do			1884	18	2.85				
Minnesota.									
Burlington	1860	11.55							
Ortonville			1888	4	3.09				
Ripley, Fort			1875	31	3.00				
Saint Vincent			1880	25–26	2.64	1880	16	1 00	1.00
Fort Snelling	1877	14.48	1877	31	5.12	1877	31	2 30	5.12
Mississippi.									
Biloxi			1888	5	2.85				
Brookhaven			1879	31	2.70	1876	26	1 00	1.35
Columbus			1885	27	2.85				
Edwards			1884	2	3.80				
Fayette			1876	7	3.10				
Hernando			1884	4	2.62				
Jackson			1884	2	2.71				
Macon			1885	27	2.65				
Okolona			1887	4	7.50				
Pass Christian			1883	29	3.20				
Vicksburg	1872	13.23	1872	23–24	5.36	1879	23	1 17	1.42
Do	1884	11.76	1876	7	3.40				
Do			1880	30	4.27				
Missouri.									
Lamar			1888	17–18	2.54				
Lebanon						1878	31	0 45	1.44
Maryville	1888	10.50							
Mound City	1888	13.40							
Saint Louis	1844	11.26	1848	17	5.22				
Do			1854	13	3.23				
Do			1860	26	3.06				
Do			1867	27	4.43				
Do			1878	2	3.26				
Do			1886	14	3.39				
Savannah	1888	11.50							
Springfield			1878	31	3.25				
Do			1888	23–24	2.52				
Montana.									
Benton, Fort	1876	11.06							
Custer, Fort						1879	13	1 00	1.00
Piegan			1879	23–24	4.10				
Nebraska.									
Brownville			1887	12	2.50				
Clear Creek			1879	30–31	3.22				
Crete			1887	13	2.60				
De Soto			1878	28–29	3.88				
Grand Island			1888	6	3.00				
Howard						1881	30	0 45	1.88
Lincoln	1881	11.89	1881	11	3.50	1881	11	3 00	3.50
Do	1882	11.33							
McPherson, Fort			1868	18	3.00	1868	18	2 30	3.00
Do			1868	25	2.75	1868	25	0 30	2.75
Do			1868	27	3.75	1868	27	0 05	*1.50
Do						1868	27	0 40	*2.25
Niobrara, Fort	1888	10.62	1888	26	5.00	1888	26	2 00	3.10
North Platte						1879	19	1 05	1.36
Do						1881	9	1 05	1.14
Omaha			1875	31	4.52	1875	31	1 00	1.00
Do			1883	8	2.98				
Red Willow						1883	8	1 00	1.28
Richmond			1875	17	3.00				
Sutton	1883	14.18	1883	25	2.80	1883	13	3 00	3.00
Valentine			1888	25–26	2.54				
Yutan			1885	27	2.56				
Nevada.									
Winnemucca	1883	1.89							
New Hampshire.									
Dumbarton	1868	11.85							
Mount Washington	1881	12.50							
New Jersey.									
Barnegat			1878	31	5.39				
Lambertville			1860	1–2	3.73				
Sandy Hook	1886	8.46							
New Mexico.									
Santa Fé	1885	2.31							
New York.									
New York City			1886	7–8	2.68				
Oswego	1883	7.03							

Table showing for the month of May, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
North Carolina.		*Inches.*			*Inches*			h. m.	*Inches*
Charlotte	1886	11.04	1886	18	4.85	1884	24	1 00	1.00
Do			1886	19-20	2.54				
Davidson College	1888	12.89	1888	6	3.91				
Ellsworth	1880	10.43	1880	22	5.50				
Do			1880	22	2.75				
Fayetteville			1878	20	2.50				
Goldsborough			1876	28	2.75	1876	28	1 00	2.75
Do			1878	21	3.75				
Hatteras			1877	7-8	2.53	1877	8	1 00	1.00
Do			1878	14.15	2.50	1888	14	1 00	1.25
Do			1883	2	3.16				
Do			1883	27	2.67				
Do			1888	10-11	4.80				
Johnston, Fort	1873	12.35							
Do	1885	10.10							
Lenoir	1888	10.00							
Marion	1888	13.99	1888	21	2.75				
New Berne	1885	10.86							
Norfolk			1888	31	3.78				
Portsmouth	1883	10.57							
Salisbury	1886	13.06	1886	19	3.75				
Weldon			1887	10	6.03				
Wilmington			1871	12	2.90	1872	8	1 00	2.00
Do			1871	13	2.54	1873	11	0 55	1.02
Do			1872	17	2.55				
Ohio.									
Bethel			1880	30	3.00				
Canal Dover						1884	27	2 00	2.15
Cincinnati			1879	25-26	2.98	1881	14	0 20	1.14
College Hill			1879	26	3.00	1888	27	0 30	2.38
Mount Auburn			1879	26	3.23				
Do			1880	10-11	2.82				
New Athens	1882	10.61							
Portsmouth			1865	25-26	3.30				
Toledo						1880	20	0 15	1.10
Do						1888	8	0 30	0.50
Do						1888	28	0 03	0.12
Oregon.									
Astoria	1887	7.33							
Pennsylvania.									
Carlisle	1860	11.60	1860	11	2.50				
Do	1868	13.06	1868	13	4.60				
Fallsington			1886	7	2.50				
Girardville			1888	28	2.72				
Mahanoy Plane			1886	7-8	3.95				
Philadelphia						1888	30	0.15	0.31
Reading						1888	28	0 40	1.07
Wellsborough			1884	26-27	2.89	1879	18	0 50	1.20
Do						1879	30	1 00	2.30
Do						1881	14	1 05	1.20
Do						1884	15	1 15	1.25
Zionsville			1886	7-8	3.00				
Rhode Island.									
Block Island	1884	6.39	1881	18	2.56				
Do			1884	6-7	3.04				
Do			1884	7-8	3.18				
Narragansett Pier			1888	12	2.54				
South Carolina.									
Abbeville	1888	10.80							
Ailendale			1883	1	2.86				
Anderson	1886	10.39	1886	19	5.12				
Do			1886	20	2.10				
Blackville			1886	20	2.84				
Cedar Springs	1888	10.60							
Charleston			1872	25-26	2.88	1872	25	0 50	1.19
Do			1874	4	2.53	1876	23	1 00	1.95
Do			1875	23	2.78	1883	12	0 17	1.08
Do			1878	26-27	3.38				
Do			1883	1-2	6.38				
Do			1888	10-11	2.67				
Columbia			1886	20	6.90	1880	12	0 20	0.50
Do			1888	20-21	2.80	1888	10	0 30	0.50
Florence			1884	26	3.99				
Graham's Turnout			1888	20	3.00				
Greenville			1886	19	4.00				
Greenwood			1886	20	3.08				
Hardeeville			1883	1	3.05				
Jacksonborough			1883	1	3.18				
Saint Matthew's	1888	10.54	1888	10	4.00	1888	10	4 00	4.00
Do			1888	20	3.00				
Spartanburg	1888	11.55	1886	19	5.53				
Trial	1888	11.23							
Yemassee			1883	1	3.70				
Do			1884	26	2.70				
Do			1885	23	2.50				
Tennessee.									
Brownsville			1886	7	3.25				
Chattanooga			1881	9-10	2.51	1880	30	1 35	1.61
Do			1886	6-7	2.66	1886	7	1 00	1.39
Do						1887	25	1 35	2.25
Do			1888	30-31	2.60	1888	30	0 55	*1.54
Do						1888	30	0 30	*0.60
Knoxville						1882	28	0 52	1.00
Memphis	1882	9.14	1876	30-31	2.93	1887	20	0 55	1.22
Do			1882	9	3.22				
Do			1883	30	2.93				
Do			1884	26-27	2.73				
Milan			1883	20	2.92				
Do			1884	4	3.58				
Texas.									
Austin			1870	30	7.60	1884	7	0 48	2.50

Table showing for the month of May, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Texas—Continued.		*Inches.*			*Inches*			h. m.	*Inches*
Austin			1876	28-29	2.50				
Do			1877	6	3.00				
Do			1878	10	2.80				
Do			1880	27	3.00				
Belton			1884	21	2.87				
Bobrne			1880	28	6.52				
Brackettville			1878	10	3.59				
Brownsville			1882	18-19	2.87	1886	3	2.20	3.48
Do			1884	7	2.69				
Do			1886	2-3	3.49				
Cedar Hill	1888	13.00	1888	22	2.50	1888	22	1 20	2.50
Clarksville	1874	14.75	1874	10	3.25	1875		1 00	1.00
Do	1878	10.34	1874	10-11	8.25				
Do			1877	24	2.50				
Do			1878	21	5.50				
Do			1882	7-8	2.75				
Do			1882	9-10	2.50				
Do			1884	1	2.70				
Do			1884	20 21	3.02				
Columbia			1884	22	2.50				
Concho	1884	13.50	1881	17	2.50				
Corpus Christi			1888	18-19	3.22	1888	18	1 00	†1.15
Do						1888	28	0 25	0.75
Corsicana	1888	10.32							
Cuero			1887	29	5.50				
Dallas			1884	21	3.49				
Do			1888	10	2.70				
Decatur			1879	5	2.70	1888	9	1 00	1.61
Do						1888	22	1 00	1.62
Elliott, Fort			1884	29	2.79	1885	27	1 30	1.44
Do			1885	19	3.32				
Do			1887	27-28	3.18				
Fredericksburg			1878	10	3.00				
Galveston			1874	27-28	5.24	1871	24	0.25	1.15
Do			1876	30	3.56	1873	18	0 45	2.00
Do						1888	24	0 45	0.86
Do			1885	8-9	3.35	1888	28	0 30	1.05
Gatesville			1879	5	4.10				
Hearne			1885	26	2.68				
Do			1887	2	2.70				
Do			1887	3	2.97				
Hempstead	1884	14.60	1884	3	4.65				
Do			1884	22	3.10				
Houston	1884	16.88	1884	3	5.50				
Do	1888	13.39	1884	22	2.63				
Huntsville	1884	13.65	1888	6	2.60				
Do			1884	22	3.06				
Longview			1887	3	4.00				
Luling			1884	22	3.10				
Mason			1880	1	3.64				
Melissa			1879	4-5	3.80				
New Ulm			1880	1	2.31				
Do			1888	6	2.54				
Palestine	1884	17.25	1882	6-7	3.54	1888	18	0.55	1.13
Do			1884	2-3	5.00	1888	24	0 23	1.17
Do			1884	21	4.38				
Do			1887	2-3	3.84				
Richardson, Fort	1869	20.22?							
Rio Grande City	1885	10.28	1878	19-20	2.72	1882	15	1 00	1.60
Do			1878	9-10	3.36	1885	29	1 00	* 3.75
Do			1885	8	4.35				
Do			1885	29	3.75				
San Antonio			1880	1	2.54	1885	13	1 00	1.50
Do						1885	17	1 00	1.25
Do						1886	2	1 00	1.50
Tyler	1884	17.47	1884	3	4.00				
Do	1887	10.29	1884	21	4.00				
Do	1888	11.84	1884	22	4.00				
Do			1887	3	4.10				
Do			1887	4	3.60				
Do			1888	24	2.99				
Waco	1885	12.44	1884	21	2.84				
Do			1885	25	4.37				
Do			1885	28	3.70				
Weatherford	1884	27.94?	1884	1	4.00?				
Do			1884	3	3.98?				
Do			1884	16	4.89?				
Do			1884	20	4.85?				
Do			1884	21	8.00?				
Weimar	1884	11.56	1884	3	2.80				
Do	1885	10.43	1885	20	4.66				
Utah.									
Salt Lake City	1876	4.30							
Vermont.									
Burlington	1883	4.63							
Strafford						1880	26	1 00	1.60
Virginia.									
Cape Henry			1888	31	3.38				
Dale Enterprise	1886	12.66							
Monroe, Fort			1888	31	4.11				
Norfolk			1886	1-2	3.42				
Do			1888	31	3.78				
Rappahannock			1887	30	2.66				
Variety Mills			1885	22	2.78				
Do			1886	7-8	3.49				
Washington.									
Tatoosh Island	1887	8.85							
West Virginia.									
Morgantown	1882	4.51							
Wisconsin.									
Embarras			1881	27-28	3.55	1881	28	0.15	2.30

Table showing for the month of May, &c.—Continued.

States and stations.	Rainfall of 10 inches, or more, per month.		Rainfall of 2.50 inches, or more, in 24 hours.			Rainfall equaling or exceeding one inch per hour.			
	Year.	Amt.	Year.	Day.	Amt.	Year.	Day.	Time.	Amt.
Wisconsin—Continued.		*Inches.*			*Inches*			*h. m.*	*Inches*
La Crosse						1882	30	0.55	2.30
Do						1888	3	0.15	1.04
Milwaukee			1875	11	2.83	1878	23	0.53	0.50
Wyoming.									1.13
Cheyenne	1884	4.83							

*Two distinct storms. † Estimated.

The meteorological records of the Signal Service show that monthly rainfalls in excess of ten inches have occurred with greater frequency and over a larger part of the country during May than in the preceding months. The April records show that these monthly rainfalls have occurred at very few stations north of the thirty-fifth parallel, while the May records show that they have occurred locally throughout the northern part of the United States to the eastward of the Rocky Mountains, although a large majority of stations report no such rainfalls, and but few have recorded more than one since the beginning of observations. Eastern Texas and the Carolinas appear to have been most subjected to these excessive monthly rainfalls. On the Pacific coast and in the following-named states (some of which have several stations with long records) rainfalls reaching 10 inches, or more, have not been noted in May, viz., Indiana, Kentucky, New Jersey, Tennessee, Vermont, West Virginia, and Wisconsin. The rainfalls of May, 1887, on the north Pacific coast appear to have been the heaviest that have fallen in that region since the beginning of observations, but no station reports as much as ten inches, Tatoosh Island, Wash., reporting the maximum, 8.85 inches.

Daily rainfalls in excess of two and one-half inches have been much more frequent in May than in any month that has yet been considered since the discussion of these rainfalls was begun in the REVIEW for October, 1887, and the area of the country subjected to same much more extended. In previous months these heavy daily rainfalls in districts to the eastward of the Rocky Mountains have been confined for the most part to the Southern States, but in the month of May they have occurred with nearly the same frequency in the upper Mississippi and lower Missouri valleys as in the Gulf States. In the lower lake region, New England, Kentucky, and Tennessee, and in portions of Virginia, West Virginia, Pennsylvania, and Ohio, very few daily rainfalls amounting to two and one-half inches have occurred during May in past years. The regions of greatest frequency of excessive daily and monthly rainfalls coincide.

While the number of stations reporting rainfalls of one inch, or more, per hour in May is somewhat greater than for previous months, the records at a majority of stations show that the heaviest rainfalls have not reached that amount. Portions of Iowa, Kansas, Nebraska, Pennsylvania, Tennessee, and eastern Texas appear to have been most subjected to excessive hourly rainfalls. Rainfalls exceeding a rate of one inch per hour have occurred in May four times since 1880 at each of the following-named stations: Wellsborough, Pa.; Chattanooga, Tenn.; Fort Riley, Kans.; 1.50 in twenty minutes (4.50 per hour) on May 14, 1885, at Fort Riley, being the maximum rate for these stations.

Of the heavy rainfalls shown by the records on file in the office of the Chief Signal Officer for the month of May the following are some of the most remarkable: Mobile, Ala., 1.64 in twenty minutes, on the 5th, 1879 (rate per hour, 4.92); Collinsville, Madison Co., Ill., 1.70 in twelve minutes, on the 23d, 1888 (rate per hour, 8.50); Fort McPherson, Lincoln Co. Nebr., 1.50 in five minutes, on 27th, 1868 (rate per hour, 18.00), and during another storm on the same date 2.25 fell in forty minutes; Emory Grove, Baltimore Co., Md., 5.00 in three hours, on 15th, 1879; Fort Snelling, Hennepin Co., Minn., 5.12 in two hours and twelve minutes, on 31st, 1877; Saint Matthew's, Orangeburg Co., S. C., 4.00 in four hours, on the 10th, 1888; Glenwood, Mills Co., Iowa, 6.00 in four hours, on 29th, 1878; Sedgwick, Harvey Co., Kans., 4.50 in two hours and fifty minutes, on 12th, 1877.

WINDS.

The most frequent directions of the wind during May, 1888, are shown on chart ii by arrows flying with the wind. The prevailing winds were from the north or northwest in the extreme Northwest and Missouri Valley; in the lower lake region and Gulf States they were mostly southerly; in the upper Mississippi valley, upper lake region, Atlantic coast districts, Rocky Mountain region, and on the Pacific coast there were variable.

HIGH WINDS (in miles per hour).

No maximum velocities of fifty or miles per hour, other than those given in the table of miscellaneous meteorological data, have been reported. The maximum velocity for the month, except at mountain stations, 80 miles per hour from the northeast, occurred at Corpus Christi, Tex., on the 28th.

LOCAL STORMS.

3d. A severe storm, accompanied by hail, passed north of Texarkana, Miller Co., Ark., during the evening, uprooting trees, etc. It is reported that crops were badly damaged and much stock killed. Reports from Camden, Ouachita Co., Ark., state that a violent storm passed through the eastern part of that county late in the afternoon, the path of the storm being about one hundred and fifty yards wide. Peru, La Salle Co., Ill.: a substantial bridge, about four hundred feet long, across the Illinois River, was wrecked by a severe storm in the evening.

6th. Kansas City, Mo.: reports from Harrisonville, Cass Co., state that one of the severest storms ever experienced occurred in the southern part of that county. The growing grain was completely destroyed by hail in some portions of the county. The heavy rainfall caused Grand River to rise nine feet within two hours. At Kansas City the storm was of considerable severity, but no damage resulted.

7th. Springfield, Mo.: a thunder-storm, moving from southwest to northeast, began at 2.35 p. m., and was accompanied by heavy hail from 3.35 to 3.42 p. m.; fruit trees and garden vegetables were seriously injured.

9th. Centreville, Montgomery Co., Ohio: at 10 a. m. a tornado passed about two miles to the northwest, its path being about one hundred feet wide. No serious damage resulted. Abilene, Tex.: heavy rain and hail began at 6.10 p. m., the hail-stones being about the size of partridge eggs; at 6.25 p. m. another hail storm occurred, the hail-stones being unusually large, some measuring nine inches in circumference. Newark, Licking Co., Ohio: the southern part of this county was visited by a destructive hail storm on the night of the 9–10th.

10th. Cleveland, Ohio: severe local storms are reported to have occurred at several points in northern Ohio in the afternoon. At West View, Lorain Co., and New Philadelphia, Tuscarawas, Co., the storms were of sufficient violence to blow down large trees and cause damage to buildings. Concordia, Kans.: thunder began at 11.55 p. m., and was immediately followed by a heavy fall of large hail, lasting two minutes; some of the hail-stones measured one and a half inches in diameter; many windows were broken and almost all tin roofs in this place were cut through by the hail; estimated damage $2,000.

11th. Penn, Cass Co., Mich.: five miles west, considerable damage was done by a severe storm which occurred about 3.30 p. m. What appears to have been a well-defined tornado is reported to have occurred near Freeport, Stephenson Co., Ill., in the afternoon. The cloud was of the usual funnel shape, and moved in an easterly direction, destroying several buildings along Yellow Creek. Valparaiso, Porter Co., Ind.: forty freight cars were blown from the railroad track and many of them demolished by the storm which passed four miles east of this place during the evening. Bellvoir, Chatham Co., N. C.: severe thunder-storms, accompanied by hail, occurred on the 11th and 12th. The heavy rains caused streams to overflow, resulting in much damage.

12th. Bell Centre, Crawford Co., Wis.: about 5 p. m. a storm of great severity passed in a southeasterly direction from near the centre of the county for a distance of two miles, its path being about a half a mile wide. Three dwellings and many other buildings were destroyed, together with nearly all fencing and timber that lay in the storm's path. Some horses and cattle were killed and a number of persons were injured. Tionesta, Forest Co., Pa.: between 12.15 and 12.30 p. m. a storm prevailed, which unroofed several buildings; a small quantity of hail fell. Lexington, Va.: wheat and garden products were much damaged by the hail storm of the afternoon of the 12th.

17th. The Signal Service observer at Dodge City, Kans., reports the following:

It is learned from reliable sources that one of the severest hail storms for a number of years occurred between 4 and 5 p. m., about five miles north of station. The hail-stones varied in size from walnuts to hens' eggs, and after the storm the hail was from three to four inches deep. Large hail also fell at Cimarron, twenty miles west of here.

Pratt, Pratt Co., Kans.: during the night of the 17–18th a violent hail storm passed over this county. All windows of north and west exposure were broken, and small animals were killed by hail. At Cullison, in the same county, the hail broke through roofs of buildings, and large quantities of hail remained on the ground until the following morning.

19th. Durham, Durham Co., N. C.: a severe and destructive hail storm occurred in the afternoon, about ten miles northeast of Durham. The hail-stones are reported to have been nearly as large as hens' eggs.

20th. Opelousas, Saint Landry Parish, La.: the cotton crop in this vicinity was seriously damaged by a severe hail storm which prevailed for about one hour in the evening. In the southern part of the parish the storm was especially severe, and the cotton crop in that section was nearly ruined. The path of the storm was about three miles wide.

21st. Alexandria, Rapides Parish, La.: a hail storm of unusual severity passed near this place about 3 a. m. Four miles from Alexandria hail covered the ground to a depth of four inches. The course of the storm was from southwest to northeast. The observer at Fort Elliott reports that an unusually severe hail storm occurred twelve miles west of that place during the evening.

22d. Mesquite, Dallas Co., Tex.: one of most destructive hail storms that has ever visited this section appears to have developed about eight miles north of this place about 9 p. m.; hail-stones fell here as large as good sized apples, and being alternately round and flat in shape. The storm's path was from two to three miles wide, and its destruction to crops was very great; the greater portion of the cotton crop had to be replanted. Pine Mills, Wood Co., Tex.: a severe hail and rain storm passed over this place, destroying nearly all the crops. Wellington, Sumner Co., Kans.: the town of Argonia, about twenty miles west of Wellington, was visited by a severe local storm which destroyed a number of buildings. The wind velocity was estimated at seventy-five miles per hour, or more.

23d. Bonham, Fannin Co., Tex.: during the afternoon a destructive tornado occurred at Brookston, about twenty-five miles east of Bonham. The path of the storm was about three hundred yards wide, and within it all buildings, etc., were demolished. The tornado was followed by heavy rain and hail. Sulphur Springs, Hopkins Co., Tex: a destructive hail storm occurred two miles east of this place. The width of the storm's path was about three miles. Cotton plants were completely destroyed and corn was seriously injured. Corsicana, Tex., the storm which occurred during the night of the 23d–24th caused damage in this vicinity estimated at $25,000. About a dozen small buildings were demolished and nearly all trees in the city were blown down.

24th. Knoxville, Johnson Co., Ark.: a violent storm, accompanied by hail, occurred during the early morning. The corn and cotton crops were badly damaged and many small buildings destroyed. Palestine, Tex.: a thunder-storm, accompanied by hail and very heavy rains, began at 11.35 and ended at 11.50 a. m.; some of the hail-stones were as large as hazel nuts; 1.17 inches of rain fell in fifteen minutes, doing much damage to railroads and farming interests in this vicinity. Vicksburg, Miss.: during a severe storm in the morning the court-house was partially unroofed and other damage done. Reports from Natchez state that the storm caused similar damage at that place.

25th. Hassan, Hancock Co., Ohio: heavy rains caused streams to rise to greater heights than have been known for many years. Athens, Jewell Co., Kans.: about 8 p. m. a violent storm of hail, rain, and wind passed over this place, causing considerable damage to buildings and crops. Boisé City, Idaho: a very destructive hail storm is reported to have occurred at Willow Creek, fifteen miles northwest of this city.

The Signal Service observer at Fort Elliott, Tex., reports:

A thunder-storm began at 4.10 p. m. and ended at 7.40 p. m., moving from southwest to northeast. Hail began at 5.18 p. m. and ended at 5.26 p. m., the hail-stones being spheroidical in shape and about two inches in diameter; formation, solid snow. The "breaks" (hills) at the foot of the plains, seven miles northwest of station, were absolutely white with hail-stones for three hours after the storm. This was observed by everybody at the station; on the morning of the 26th I walked down to the Sweetwater Creek, three-fourths of a mile distant, and saw great banks of hail-stones which had been washed down during the night. The bottoms along the Sweetwater were literally covered with banks of hail-stones from six to eight feet in depth. It was estimated that there was enough hail to cover ten acres to a depth of six feet. The hail-stones killed five horses which were out on the prairie, on a ranch six miles north of station. The Sweetwater Creek was higher than ever known before, the freshet destroying nearly the entire post garden. The high water is supposed to have been caused by a "cloud-burst" at or near the foot of the plains, where the Sweetwater has its source; there was only 0.36 inch of rainfall at the station. On Sunday, May 27th, hail-stones were collected on the banks of the Sweetwater, which had been washed down and lay in drifts six feet deep, actual measurement by the observer.

26th. Fort Reno, Ind. T.: it is reported that a tornado occurred at Silver City, twenty-five miles southeast of here, at 3.30 p. m. Several out-buildings were destroyed, and twenty-five head of cattle killed. Manhattan, Riley Co., Kans.: a rain and hail storm occurred during the afternoon, one inch of rain falling between 5.30 and 6 p. m. Fifteen miles northwest of Manhattan wheat, oats, etc., were destroyed. The storm was also very severe and destructive in Clay and Cloud counties, lying northwest of Riley county. Cedarville, Crawford Co., Ark.: a tornado occurred in the Indian Territory, ten miles northwest of this place, at about 7 p. m. It moved in a direction to the north of east, the width of its path being about one-fourth of a mile and the length about twelve miles. The storm passed through a heavily timbered region, destroying nearly all timber in its course. Evansville, Washington Co., Ark., was in the path of the storm and, at that place, two dwellings were demolished and several buildings unroofed. Wakefield, Clay Co., Kans.: a severe rain and hail storm began at 4.25 a. m.; a large quantity of hail fell, some of the stones being as large as hens' eggs; much damage was done to small fruits, vegetables, etc., in the path of the storm. Chadron, Dawes Co., Nebr.: a "cloud-burst" occurred in the northwestern part of this county during the night of the 26–27th, submerging five miles of railroad track and washing out numerous bridges. White River rose six feet in less than an hour.

27th. Indianapolis, Ind.: a severe thunder-storm prevailed from 6 to 9.25 a. m.; heavy rain fell from 8.20 to 9.35 a. m.

during which time 1.25 inches of rain fell. Hail fell for five minutes, the hail-stones measuring one-quarter of an inch in diameter; in the outskirts of the city the hail was of much larger size. Hillsborough, Hill Co., Tex.: a large number of buildings were wrecked or damaged by a tornado which occurred here at 7 a. m. The damage is estimated at $100,000. Davenport, Iowa: the rain and hail storm in the afternoon caused damage in this vicinity to buildings, crops, etc., estimated at $50,000 or $60,000. The storm began at 3 o'clock and continued for about twenty minutes. Elgin, Kane Co., Ill.: at 5.30 p. m. a destructive hail storm occurred. The hail-stones were of remarkable size and broke large quantities of window glass. Reports from Galesburg, Knox Co., state a hail storm occurred at that place also. Memphis, Tenn.: the storm on the night of the 27-28th caused no damage at this place, but reports show that it was very destructive in other parts of the state. Reports from Holly Springs, Miss., state that the storm was unusually severe in that vicinity. Des Moines, Iowa: during the night of the 27-28th South Des Moines, Sevastopol, and Bloomfield townships were visited by a very destructive storm. Hail fell in large quantities, some of the hail-stones being unusually large.

28th. Chambersburg, Franklin Co., Pa.: about 4 p. m. a terrific hail storm passed over this place. The hail-stones were unusually large and of irregular shapes. Large quantities of window glass were destroyed, and persons and animals were seriously cut and bruised by the falling hail. Canton, Stark Co., Ohio: at about noon a severe storm passed over this place, causing damage estimated at $60,000, $50,000 of this amount being sustained by the New Hampden watch factory, the south wing of which was destroyed. Savona, Steuben Co., N. Y.: about 5 p. m. severe and destructive local storms occurred in this and neighboring counties. Reports from Cameron Mills, in Steuben Co., Wellsville, Alleghany Co., Olean, Cattaraugus Co., and Elmira, Chemung Co., show that storms of unsual severity occurred at those places, causing damage to a greater or less extent. The "New York World" of the 29th states that twenty business blocks at Waterville were unroofed, and that a church and several other buildings at Allentown, Alleghany Co. were wrecked. Wheeling, West Va.: severe local storms occurred in this part of the state, and in some places they were accompanied by hail. Much damage was done by lightning. Cadiz, Harrison Co., Ohio: a storm of great severity prevailed at this place in the afternoon, causing damage to many buildings. Eden, Erie Co., N. Y.: about 7 p. m. a hail storm occurred here, the hail-stones being of considerable size; the storm was about of twenty minutes duration. Oil City, Pa.: a violent and destructive storm occurred here at between 2.30 and 3 p. m. Remarkably severe storms also occurred at other points in this and neighboring counties, and, in some instances, the characteristics of tornadoes were apparent. In the vicinity of Clintonville, Venango Co., numerous derricks and out-houses were blown down. Similar damage was also done at Fern and vicinity, in Clarion Co., and at Titusville, Crawford Co. Zanesville, Muskingum Co., Ohio: the storm which passed over this section in the morning was of unusual severity. At Gaysport three spans of a new bridge were carried away.

31st. Cartwright's Wharf, Nansemond Co., Va.: about 4 p. m. a storm passed over this place, moving in a northeasterly direction, blowing down many trees and causing damage to buildings.

WATER-SPOUTS.

Capt. C. H. Hossack, of the s. s. "Saint Asaph," reports: "May 1st, 5 p. m., in N. 27° 52′, W. 79° 41′, observed one large and six small water-spouts; the former appeared large at the clouds and got gradually smaller as it neared the surface of the sea, where it ended in a long curve from ne. to sw. On looking at it with glass, it seemed spiral in shape and travelling from e. to w.; although only about one mile distant, could see no ascending currents. The smaller spouts appeared to be within one-eighth of a mile of each other and distant about seven miles from the ship. They seemed large at the clouds, decreasing in size toward the centre, and increasing at the base, and were travelling from e. to w. Barometer and thermometer steady, no fluctuation in either observable."

Capt. J. W. Tobin, of the s. s. "Alps," reports: "Near Jamaica, W. I., May 10th, between 4 and 5 p. m, (Greenwich time) observed eight or ten water-spouts to the westward; at 5 p. m. was struck by a heavy squall of rain, with wind-force about 9, from se., lasting three hours, after which dirty weather continued until we were well to the northward of the Bahama Banks. There was no notable change in the barometer."

INLAND NAVIGATION.

OPENING OF NAVIGATION—ICE IN RIVERS AND HARBORS.

Strait of Macinac.—Saint Ignace, Macinac Co., Mich.: on the 1st there were from twenty to thirty ice-bound vessels between Waugoshance Light and Saint Helena's Island. The ice in the strait broke during the 4th and a large fleet passed through.

The following table, showing the dates of the opening of Mackinac Strait for each season since 1854, is from the "Chicago Inter-Ocean" of May 5, 1888:

Year.	Date.	Year.	Date.
1854	April 25	1872	April 28
1855	May 1	1873	May 1
1856	May 2	1874	April 29
1857	May 1	1875	April 28
1858	April 6	1876	April 28
1859	April 4	1877	April 20
1860	April 13	1878	Mar. 14
1861	April 25	1879	April 23
1862	April 18	1880	April 5
1863	April 17	1881	May 4
1864	April 23	1882	April 5
1865	April 21	1883	April 28
1866	April 29	1884	April 28
1867	April 23	1885	May 6
1868	April 19	1886	April 21
1869	April 23	1887	April 23
1870	April 18	1888	May 4
1871	April 3		

The remarkably early opening of 1878 (March 14) was seven weeks in advance of the present season.

Lake Erie.—Buffalo, N. Y.: floating ice on the 1st; lake full of ice on 10th.

Lake Michigan.—Milwaukee, Wis.: the ice in the strait of Macinac broke up on the 3d, and vessels on both sides passed through. The steamer "Oswego" reached this point at 11 p. m., being the first arrival of the season from the lower lakes.

Green Bay.—Green Bay, Wis.: the steamer "Welcome" which cleared on the 2d was the first departure of the season; the first arrivals were the steamers "Middlesex" and "De Pere," on the 4th.

Lake Superior.—Duluth, Minn.: the steam barge "Kosato," from Buffalo, N. Y., arrived on the 12th, and the propeller "Fremont" cleared on same date. There was much broken ice in the lake on the 22d, rendering navigation dangerous.

Marquette, Mich.: the harbor was cleared of ice by a strong westerly wind during the night of the 4–5th. The steamer "Toledo" arrived on the 11th, being the first boat of the season.

Devil's Lake.—Fort Totten, Dak.: the ice in the lake broke during the morning of the 10th, and by 9 a. m. had entirely disappeared. Steamer "Minnie H." made her first trip this season on the 11th.

Missouri River.—Poplar River, Mont.: the steamer "Batchelor" arrived on 25th, being the first arrival of the season.

STAGE OF WATER IN RIVERS AND HARBORS.

In the following table are shown the danger-points at the

various stations, the highest and lowest depths for May, 1888, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, May, 1888 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La.....	39.9	19	30.3	4	20.6	9.7
Arkansas River:						
Fort Smith, Ark ...	22.0	21	17.8	16	4.6	13.2
Little Rock, Ark...	23.0	23	18.4	16, 17	5.9	12.5
Missouri River:						
Omaha, Nebr	18.0	30	13.1	6	9.5	3.6
Leavenw'rth, Kans.	20.0	31	16.5	22	12.2	4.3
Mississippi River:						
Saint Paul, Minn...	14.5	11	14.1	24	10.2	3.9
La Crosse, Wis	24.0	8, 9	15.7	25	12.0	3.7
Dubuque, Iowa	16.0	12, 13	22.4	29, 30	15.8	6.6
Davenport, Iowa...	15.0	15, 16	18.6	31	13.0	5.6
Keokuk, Iowa	14.0	16	19.6	6	15.3	4.0
Saint Louis, Mo ...	32.0	31	28.9	1, 2, 3	21.6	7.3
Cairo, Ill	40.0	31	31.1	11	23.8	7.3
Memphis, Tenn....	34.0	31	25.2	6, 7, 12, 13	20.0	5.2
Vicksburg, Miss ...	41.0	1	43.6	21, 22	27.4	16.2
New Orleans, La ..	13.0	3	14.8	23, 24	10.9	3.9
Ohio River:						
Pittsburg, Pa	22.0	20	9.3	5	2.8	6.5
Cincinnati, Ohio ...	50.0	28	18.0	8, 10, 11	9.7	8.3
Louisville, Ky.....	25.0	29	8.0	12, 13	5.7	2.3
Cumberland River:						
Nashville, Tenn ...	40.0	29	8.8	15, 16	3.4	5.4
Tennessee River:						
Chattanooga, Tenn .	33.0	25, 26	9.6	8	4.0	5.6
Monongahela River:						
Pittsburg, Pa	29.0	20	9.3	5	2.8	6.5
Savannah River:						
Augusta, Ga.	32.0	22	21.7	4, 5	8.2	13.5
Willamette River:						
Portland, Oregon ..	.....	20	11.9	2, 3	8.3	3.6

FLOODS.

The upper Mississippi river was at a high stage throughout the month, but its maximum height at stations north of Saint Louis, was reached between the 8th and 16th. Extensive damage was done at various places along its banks, in Illinois, Iowa, and Missouri, but from the reports at hand it appears that the flood was most disastrous in the vicinity of Quincy, Ill., where large areas of land under cultivation were inundated and much property destroyed.

In the following table are given the stages of water in the Mississippi River during May, 1888, at certain stations in, or near, the flooded region. The observations were made at 2 p. m. 75th meridian time:

Date	Dubuque.	Davenport.	Keokuk.	Saint Louis.
	Danger-line (16 feet).	Danger-line (15 feet).	Danger-line (14 feet).	Danger-line (32 feet).
	Feet.	*Feet.*	*Feet.*	*Feet.*
1	17.6	15.4	15.9	21.6
2	17.3	15.0	16.0	21.6
3	16.9	14.5	15.7	21.6
4	17.2	14.3	15.8	22.2
5	18.0	14.1	15.5	22.4
6	19.0	14.0	15.3	22.5
7	19.9	14.3	15.5	22.7
8	20.8	15.1	16.1	23.0
9	21.7	15.9	16.3	23.0
10	22.0	16.6	16.6	23.4
11	22.3	17.4	17.1	24.2
12	22.4	17.9	18.2	24.4
13	22.4	18.3	18.8	24.7
14	22.3	18.5	19.2	25.3
15	22.1	18.6	19.4	25.5
16	21.9	18.6	19.6	25.6
17	21.5	18.5	19.5	25.7
18	21.3	18.4	19.4	26.4
19	20.7	18.1	19.2	26.9
20	20.3	17.9	18.9	26.8
21	19.9	17.5	18.7	26.9
22	19.4	17.2	18.5	27.4
23	18.9	16.6	18.1	27.8
24	18.3	16.3	17.7	27.9
25	17.5	15.7	17.4	27.6
26	16.9	15.2	16.8	27.4
27	16.5	14.8	16.9	27.2
28	16.0	14.4	16.9	27.0
29	15.8	14.0	17.0	27.8
30	15.8	13.3	16.5	28.6
31	16.0	13.0	15.8	28.9

Concerning the flood in the Mississippi River the following reports are given:

Saint Paul, Minn.: the river reached the highest point at noon of the 10th, and began to fall on the 12th. No serious damage resulted from the high water in this vicinity, except on lowlands on the opposite side of the river where the occupants of a few houses were compelled to move to higher places.

Winona, Winona Co., Minn.: there was a further rise of four inches in the river at this place during the night of the 3d–4th. On the 4th about one-third of the town was under water, and hundreds of families were compelled to move.

La Crosse, Wis.: the river reached its highest stage on the 8th and 9th, when some of the farm lands south of this place were submerged, and the people living on the lowlands to the northward moved to higher ground. No serious damage resulted from the overflow.

Dubuque, Iowa: the river rose steadily from the 4th until the 12th, when the highest point, 22.4 feet, was attained, being 0.4 feet below high water mark of 1880. The Illinois Central Railway track south of the depot in this city was from one to two feet under water on the 9th, and all mills and factories had to suspend work, leaving hundreds of people idle. Numerous warehouses and dwellings were also under water, and families moved to higher points for safety. The total loss by the flood is estimated at $100,000.

Davenport, Iowa: the river rose to the danger-line on the 8th, and continued to rise until the 15th, when its highest point, 18.6 feet, was attained, this being the highest stage recorded since the establishment of the Signal Service station in this city in 1871; the river remained stationary on the 15th and 16th, and on the 17th it began to fall slowly. Several dwellings in the eastern section of the city were flooded, and numerous families had to leave their houses. The Chicago, Burlington, and Quincy, Chicago and Rock Island, and the Chicago, Milwaukee, and Saint Paul railroad tracks were eight inches under water, and all warehouses on the river front were under water up to the first floors. The Rock Island lumber company lost 1,000,000 feet of logs, valued at $20,000. At Moline, Ill., all the large plough and wagon shops and other factories had to shut down on account of high water, throwing several hundred people out of employment.

Keokuk, Iowa: on the 10th the river gauge showed a depth of 16.6 feet, and on that date the water began to overflow the lumber yards and saw mills at this place, and trains on the Saint Louis, Keokuk, and Northwestern Railway, which had been running over submerged tracks for several days, were discontinued. On the 11th the levee at Alexandria, Mo., gave way, and thousands of acres of rich farm land were inundated to the south and west of Alexandria. On the 14th both the Sny and Indian Grave levees gave way, flooding about 200,000 acres of bottom lands, the greater part of which had been sown in winter wheat, and the farmers residing in the overflowed area were driven from their homes. On the 16th the highest stage of water was reached, 19.6 feet, this being the highest point that has occurred since 1851. At the close of the month it was not possible to calculate the damage resulting from the flood though it was estimated that $3,000,000 would not cover the loses sustained in the vicinity of Keokuk. The greatest damage probably consisted of the large amount of winter wheat ruined by the breaking of the levees, while the damage to the levees themselves, and the losses resulting from the interruption of traffic, constitute an enormous sum. No loss of life is known to have occurred, and but little stock was lost. This was doubtless due in great measure to the warnings given to those living in the threatened districts. Many business establishments kept their correspondents constantly informed as to conditions of the river, obtaining the information through the Signal Servive observer. Railway officials were also kept constantly informed as to the condition of the river, and they in turn distributed the information to points along their lines.

Quincy, Ill.: the great flood of May in the upper Mississippi river caused a vast amount of damage in this vicinity. At the close of April the river had reached a dangerous height and overflowed the lowlands in the vicinity of Alexandria, Mo.,

about thirty miles north of Quincy. The river was nearly stationary during the first few days of the month, but after the 6th it rose steadily and on the 11th had overflowed to such an extent that at this place it was ten miles wide, and hundreds of farms were submerged, the water being several feet deep. The Saint Louis, Keokuk, and Northwestern Railroad discontinued the running of trains north of Quincy, cutting off communication between La Grange, Canton, and Alexandria, Mo. On the 13th the river was within two feet of the highest point attained during the year 1881 and continued to rise. On this date sixty-five miles of railroad track between Hannibal, Mo., and Keokuk, Iowa, were submerged to a depth ranging from six inches to three feet. Within the limits of Quincy the high water caused much inconvenience to foundries and factories, and at the water-works. The breaks in the Indian Grave levee during the night of the 13–14th caused a further rise and consequently an increase in the overflowed area. On the 17th the water reached a height exceeding that of the flood of 1881, leaving only the flood of 1851 with a higher record. On this date the factories in the manufacturing districts were nearly all shut down, and there was more than three feet of water in the water-works. The Sny levee broke in several places immediately above the Hannibal bridge at 6.15 a. m., flooding a thickly populated district, and compelling the inhabitants to move.

Concerning the flood in the vicinity of Quincy, the "Chicago Times" of the 18th contained the following:

Above and below Quincy are over one hundred miles of levees, protecting fully 200,000 acres of the most productive farming lands in the valley. On Sunday morning, 13th, the first break occurred in the great embankment known as the Indian Grave levee. During the day two other crevasses were made, and within a few hours thousands of acres of winter wheat that promised a yield of from forty tr sixty bushels to the acre were laid waste. The farmers had been working on the embankment night and day in the hope of saving their homes, and when the flood came a majority of them had barely time to save their families, so sudden and overwhelming was the rush of the torrents.

Outside the embankment was the great river, a solid body of water twenty feet deep, and as soon as a crevasse was made it poured through the opening with a roar that could be heard a long distance. Homes were deserted on a moment's notice from riders who were sent out to give warning of the dangers, in many cases the people being obliged to leave everything and to fly to the bluffs or seek safety in boats. On Monday the Sny Carte levee, an embankment commencing just below Quincy and extending south a distance of fifty-four miles, gave way between Hannibal and Louisiana, and the scenes enacted the day previous were repeated and intensified.

Early in the week the Alexandria levee, thirty miles above Quincy, gave way, completely flooding that thrifty city. The crevasses made in the Sny levee at East Hannibal to-day completed the destruction in all the levee districts. Not an acre of ground in this vast territory can escape the flood, and the loss to farming intersts is simply incalculable. Cattle and horses in the fine wooded pastures were overwhelmed in many localites and drowned. The river above and below the city is from ten to fifteen miles broad, covering all the farms on both sides and extending from the bluffs on the Illinois side to the high bluffs in Missouri.

On the dry places on the embankment are hundred of cattle, horses, and hogs without feed and no prospect of drink, except when in danger of being swallowed up by the floods. Far across on the opposite bluffs are gathered hundreds of men, women, and children, many of them utterly destitute, having neither sufficient clothing nor shelter, and some suffering for food, despite the bravery of their more fortunate neighbors, who are making every exertion to relieve their immediate wants.

The "Saint Louis Post-Despatch" of the 19th says:

QUINCY, Ill., *May* 19.—The river is falling very slowly at this point. Since 2 p. m. Thursday, 17th, when the highest point, 19 feet 9½ inches, was reached, it has fallen four inches. The extent and position of the levees that have given way during the present tremendous rise are as follows: The Hunt levee is in Hancock Co., extending from Warsaw to four and one-half miles above Canton, Mo. It was built in 1879. It is twelve miles long and cost from $50,900 to $60,000. This levee enclosed from 16,000 to 17,000 acres of land, largely cultivated and covered with growing crops. At least one hundred families lived in this district, and they are now homeless and destitute.

The Indian Grave levee is eighteen miles long, twelve miles on the river and six in the two cross levees, one of which is opposite Canton, and the other at the head of the bay, and is entirely within Adams Co. This levee was built in 1879, at a cost of about $200,000. It inclosed a fertile district of 14,000 or 16,000 acres, land generally improved and planted with growing crops. The amount actually lost in these two districts can only be roughly estimated.

The following reports relate to freshets which occurred in other sections of the country:

Chippewa Falls, Chippewa Co., Wis.: a part of this town was inundated on the, 1st compelling several families to move.

Brownsville, Tex.: the Rio Grande river was very high on the 1st and 2d, and overflowed on the latter date in two places between Santa Maria, Tex., and this city. The river began to fall slowly on the 3d.

Fort Benton, Mont.: the Missouri River reached an unusually high stage on the 12th, compelling suspension of work on the bridge now being constructed.

Ishpeming, Marquette, Co., Mich.: about one mile of the Duluth, South Shore, and Atlantic railroad track near here was three feet under water on the 12th.

Marinette, Marinette, Co., Wis.: the Menominee River reached on the 12th the highest stage known for many years.

Galena, Jo Daviess Co., Ill.: on the 12th a large part of this place was inundated to such an extent that boats were used in several streets. The water reached a depth permitting boats to be rowed about the Custom House and Post Office buildings.

Livermore Falls, Androscoggin Co., Me.: some roads in this vicinity were from three to five feet under water on the1 2th.

Shakopee, Scott Co., Minn., 12th: the rains of the past week have been unusually heavy, and have caused the Minnesota River to overflow adjacent bottom lands.

The "Kansas City Journal" of May 14th, says:

ST. LOUIS, *May* 13.—Advices from in the Red River country report that the damage done the Red River Valley during the past ten days is almost beyond computation, and the overflow the largest since 1843. Most of the plantations near the river have been covered with water four to six feet deep, and many miles of fencing, cribs, and barns have been washed down and carried away. Many of the people have lost their household furniture, provisions, and corn. In several places the water extended from the hills of Arkansas to the hills of Texas, a distance of ten to fourteen miles.

New Haven, Conn.: reports from Hartford on the 15th stated that a rise of two and one-half feet had occurred in the Connecticut River since the day previous, and that some of the docks were submerged.

Fort Fairfield, Aroostook Co., Me., 16th: numerous washouts have occurred on the New Brunswick Railroad. A large quantity of lumber was washed away at this place on the 15th.

Lead Hill, Boone Co., Ark., 17th: all streams running into White River in this locality overflowed, causing damage to fences and crops. White River was very high on the above date, overflowed bottom-lands, but did no serious damage.

Hannibal, Mo: the lower part of this place was submerged on the 17th; business was practically suspended in consequence.

Eau Claire, Eau Claire Co., Wis.: more than one hundred families were compelled to vacate their homes on account of the flood on the 18th.

Stockton, Rooks Co., Kans., 26th: the heavy rain during the night of the 25–26th caused the Solomon River to flood the adjacent lowlands.

Atchison, Kans.: streams in this section were greatly swollen by the heavy rains of the 26th, and many washouts occurred.

Tilden, Madison Co., Nebr., 27th: the recent heavy rains have swollen the Elkhorn River and caused washouts in the surrounding country.

HIGH TIDES.

Southport, N. C., 21st, 24th, 30th; Cedar Keys, Fla., 25th; Wilmington, N. C., 28th, 29th.

ATMOSPHERIC ELECTRICITY.

THUNDER-STORMS.

From the accompanying table it will be seen that thunder-storms were reported from the largest number (thirty-three) of states or territories on the 28th, and that they occurred in

nearly as many (twenty-eight) on the 29th and 30th. They were least extensively reported on the 13th, on which date they occurred in but ten states or territories, the 2d and 16th being nearly as free from thunder-storms as the 13th. In Florida, Indian Territory, Kansas, and Texas thunder-storms occurred on from twenty-six to twenty-nine days out of the month, Texas reporting the greatest number of dates. They occurred on five days, or less, in Connecticut, the District of Columbia, Maine, New Hampshire, Rhode Island, Utah, Vermont, and Washington Territory; Maine and Utah showing the least, one. There was no state or territory in which they did not occur.

Table showing the number of stations in the several states and territories reporting thunder-storms for each day during May, 1888.

State or Territory.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.
Ala	..	..	..	4	4	..	..	4	3	2	1	1	1	..	..	..	..	..	1	..	2	1	..	1	3	..	..	..	1	2	2
Ariz	..	..	..	3	3	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	2	..	..	..	..	..	..	..	1	1	..
Ark	..	..	3	..	..	..	2	..	2	2	2	..	2	1	3	3	1	1	..	..	..	..	1	1	..	..	..	..	..	..	1
Cal	..	..	..	..	..	..	..	..	..	..	6	9	1	1	..	..	..	..	..	1	..	1	1	..	..	1	1	..	..	1	..
Colo	..	..	..	1	3	..	1	..	..	..	..	..	..	..	1	..	2	1	1	1	5	4	3	2	1	2	..	..	..	2	3
Conn	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	4	1	..
Dak	1	2	..	..	..	..	..	..	1	..	..	..	..	1	2	..	..	..	1	4	2	2	..	..	..	..	..	1	3	..	1
D. C	..	..	..	..	..	..	1	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Fla	1	..	2	3	5	..	..	2	4	4	7	8	..	1	..	1	2	1	5	11	7	7	1	3	5	4	2	5	7	4	7
Ga	..	..	..	2	2	3	1	2	1	..	2	..	..	..	..	..	..	..	1	1	..	..	1	..	2	2	1	..	2	5	5	3
Ill	..	1	7	2	..	..	3	3	..	3	2	..	..	..	..	..	..	..	1	..	..	..	1	2	4	..	2	5	4	1	3	1
Ind	..	..	3	3	..	1	5	4	1	..	3	1	..	..	2	1	..	..	5	..	..	..	..	1	5	2	1	7	7	..	..	1
Ind. T	1	1	1	..	3	4	1	2	3	1	..	1	2	2	4	3	2	4	1	2	1	3	3	3	1	3	4	1	1	1	..
Iowa	..	2	13	22	..	..	11	..	..	1	14	..	..	..	..	6	..	..	..	..	4	3	3	..	1	14	8	8	1	6	..
Kans	1	7	9	1	5	11	5	1	2	8	3	..	1	1	10	1	8	..	..	1	4	7	14	1	1	9	5	3	..	3	1
Ky	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	1	1	..	1	1	..	..	..
La	..	..	2	..	2	2	1	..	..	2	..	..	..	..	..	..	1	1	1	2	..	..	..	3	1	..	..	2	2	..	..
Me	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
Md	..	..	..	..	1	..	..	..	1	..	3	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	..	..
Mass	..	..	..	..	..	..	..	1	..	..	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9	3	4	..
Mich	..	..	1	..	..	..	3	2	3	5	..	..	..	..	..	..	..	..	..	..	2	1	..	3	5	..	1	..	..	..	..
Minn	1	6	5	..	..	..	..	..	1	..	..	..	..	..	..	..	17	..	..	6	9	5	3	..	..	..	2	1	..	1	..
Miss	..	..	1	1	2	..	1	1	1	1	..	..	..	..	..	..	..	..	..	..	1	1	1	3	3	..	..	..	1	1	..
Mo	..	1	3	..	..	1	4	..	2	1	..	..	2	..	3	2	3	3	..	..	..	1	4	4	..	3	3	..	..	..	..
Mont	2	1	1	2	..	..	..	8	..	..	..	..	..	..	..	..	..	2	2	..	..	..	..	..	1	..	..	2	1	..	..
Nebr	1	4	4	1	2	5	..	..	..	2	..	..	..	..	4	..	..	..	..	2	4	3	..	..	3	6	5	2	1	1	..
Nev	..	..	..	..	..	..	..	..	..	..	..	..	2	3	..	..	..	..	..	..	..	..	23	24	..	..	..	1	1	..	..
N. H	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
N. J	..	..	..	..	4	..	..	..	2	..	..	5	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	6	7	5	..
N. Mex	..	..	..	2	3	1	..	2	..	..	..	..	..	..	1	3	1	..	..	1	..	..	..	..	..	..	..	1	1	..	..
N. Y	..	..	..	3	1	..	..	..	10	12	..	7	..	3	2	..	..	..	..	..	..	..	..	..	..	..	..	18	7	1	10
N. C	5	..	..	1	1	2	..	..	1	..	1	4	..	2	1	1	..	..	3	1	..	1	2	1	3	1	..	1	2	2	2
Ohio	..	..	11	..	..	..	1	17	11	1	..	1	..	1	..	..	..	2	..	1	..	..	..	..	3	..	27	15	..	..	1
Oregon	..	..	..	..	..	..	..	..	..	..	..	5	4	..	..	..	..	..	..	..	..	3	..	..	2	4	3	4	5	3	
Pa	1	..	1	3	1	..	..	1	7	3	..	4	..	3	1	..	..	1	..	..	..	..	..	..	1	..	1	13	4	2	4
R. I	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	2	1
S. C	..	..	..	3	3	2	3	..	2	3	..	..	..	..	..	..	..	..	1	3	..	..	1	..	..	1	..	3	1	2	2
Tenn	..	..	1	1	..	3	2	2	2	1	..	..	..	..	2	2	1	..	..	..	..	1	5	..	..	1	2	1	2	..	
Tex	1	3	5	1	3	13	4	7	9	8	1	3	2	10	..	3	5	10	3	2	2	3	2	6	5	1	7	7	3	1	..
Utah	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Vt	2	..	..	..	..	..	..	..	..	3	1	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Va	2	..	..	3	..	..	1	2	1	..	1	7	..	1	..	..	..	1	..	..	1	1	..	..	4	..	2	2	2	4	4
Wash	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
W. Va	..	..	..	4	..	..	1	2	4	..	2	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	3	2	..	..	2
Wis	..	1	5	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	1	..	..	3	4	1	..	..	1	..	1	..
Wyo	1	..	..	1	..	..	..	..	..	..	..	..	..	..	2	..	..	..	4	3	1	3	4	3	2	1	..	3	..	..	
Total No. states rep'g	14	11	20	21	18	13	17	19	23	24	14	14	10	18	17	11	12	16	14	18	13	17	21	20	20	16	20	33	28	28	19

The Signal Service observer at Eureka, Humbolt Co., Cal., reports:

Between 10 a. m. and noon on the 22d distant thunder was heard at intervals and a light shower of rain fell. This thunder-storm was of moderate character and in the Eastern States would have attracted no attention, but as thunder-storms are of rare occurrence here it was a matter of great surprise.

AURORAS.

Auroral displays were quite extensively observed on the evenings of the 7th and 20th. On the 7th a cloud-area extended from Colorado and Wyoming eastward to the lower lakes and Ohio Valley, doubtless obscuring the aurora at many of the more northerly stations at which it prevailed. This display was quite brilliant over the northern portions of Minnesota and Dakota and the upper lake region, and at some stations in New England.

The evening of the 20th was quite favorable for observing the aurora which occurred on that date. An area of cloudiness, however, covered the extreme northern portions of the upper lake region and upper Mississippi valley, but the weather was generally clear in other northern districts east of the Rocky Mountains, and the aurora was reported from a majority of the reporting stations in the northern districts from the Mississippi Valley eastward to the New England coast. While the display of the 20th was not reported to the westward of Minnesota it was seen in more southerly latitudes than was the more extended display of the 7th.

The following are descriptions of the more important displays of the month:

Hartford, Conn.: a very brilliant aurora was visible on the 6th, consisting of a long band stretching nearly to the zenith, and a number of short streamers.

Bismarck, Dak.: an aurora was observed at 11.30 p. m., 7th, consisting of an arch of yellow light which extended to altitude 45° and covered the horizon from azimuth 135° to 225°. At 11.30 p. m. some streamers were noticed, and at the same time a pillar of light, separate from the main aurora, appeared in azimuth 120°, with radiating streamers at the top which rose to altitude 90°; the aurora ended at 2 a. m.

Fort Buford, Dak.: on the evening of the 7th a brilliant aurora was observed in the form of a whitish light resting on a dark base, from which streamers of orange color tinted with green rose to an altitude of 75°. The display was most brilliant from 11.58 p. m. to 12.25 a. m.

Moorhead, Minn.: a well-defined auroral arch of altitude 25° was observed at 10.50 p. m., 7th. The arch rose gradually until near midnight when it extended across the zenith in the form of a broad, sharply defined belt of light. Just before the arch began to rise the whole northern sky was covered for about twenty minutes with streamers shooting up to an altitude of 80°.

The following is furnished by Harvard College Observatory, Cambridge, Mass.:

Aurora looked for every clear evening; results as follows: May 7th, 11.15 p. m., low auroral arch; first seen at 9 p. m.; still visible. 20th, irregular aurora, bright in moonlight, with some appearance of streamers, conspicuous about 9.30 p. m. and later; sky not especially dark below. About 1.45 a. m., 21st, straight the aurora had the form of a pair of distinct arches, side by side, with a band connecting them in the north; sky dark below. About 2.30, aurora, irregular, with faint light as high as Polaris.

Marquette, Mich.: a very brilliant aurora was observed from 8.10 to 11.40 p. m., 7th; it first appeared as a pale white arch, extending from azimuth 135° to 230°; at 9.50 p. m. a number of bright streamers of various heights, a few reaching an altitude of 70°, were observed; sheets of light of pink, green, and yellow colors, having a lateral, as well as an upward and downward, motion, were also observed.

The Rapid City, Dak., "Daily Journal" of the 8th states that a remarkably fine display of the aurora was seen at that place during the early morning of the 7th.

Saint Vincent, Minn.: an aurora was observed at 10.30 p. m., 8th, at which time it appeared as an indistinct pillar of light in the north, having an altitude of 35° and a slow motion to the westward; at 11 p. m. it had reached a position at right angles to the magnetic meridian, and there appeared a fine arch of light, extending from the eastern to the western horizon, passing through the zenith; short columns of light converged towards the zenith; the arch began to fade at 11.30 p. m., the ends bending in toward the north and the crowns moving slowly southward, and disappeared when 10° south of the zenith; a faint whitish light shone in the north during the remainder of the night. On the 20th an irregular auroral arch, 35° high, was observed at 10 p. m.; at 10.30 p. m. the arch had reached an altitude of 55°, and the space between it and the zenith was covered with confused masses of white light resembling cirrus-stratus clouds; the maximum intensity of the display occurred at 10.50 p. m., when almost the entire heavens were covered with patches of auroral clouds, converging at, or near, the zenith; the general movement of the light was easterly and southerly.

New Haven, Conn.: an aurora became visible at 8.30 p. m. on the 20th; it first consisted of an arch, resting on a dark segment, which extended to altitude 30° and covered 80° of the horizon; the aurora was quite brilliant at times and faded away gradually until at 9.30 p. m., when the arch changed to streamers, and at 10.30 p. m. the northern sky was all aglow

with merry dancers, extending up to altitude 80°; its maximum brilliancy occurred at 11 p. m., and the display ended at midnight.

Burlington, Vt.: a very brilliant aurora was observed from 9 p. m. to midnight of the 20th; waving flashes of light extended from altitude 10° to the zenith.

Lansing, Mich.: an aurora was observed from 9.10 to 11 p. m. on the 20th, consisting of two arches, the lower one having an altitude of 25°. Streamers shot up at intervals from the lower arch to an altitude of 40°.

Clinton, Clinton Co.: an auroral arch extended from east to west and to an altitude of 40° from 9 to 10 p. m. on the 20th.

Manchester, N. H.: an aurora was observed at 9.30 p. m., 20th, as a narrow, irregular arch above a dark segment; the arch extended to altitude 30° and covered 100° of the horizon; the aurora increased slightly in brilliancy after 10.15 p. m., when faint merry dancers appeared along the upper edge of the arch, shooting upwards to the zenith.

Mr. A. G. Wolf, the light-house keeper at Atlantic City, N. J., reports having observed an auroral arch, resting on a dark segment 10° high, from 10.30 p. m. on the 21st until 3 a. m. on the following date; the arch extended to altitude 45° and covered about 79° of the horizon.

Auroras were observed on the several dates during the month as follows; 1st, Oakland, Cal.; Traverse City, Mich.; Fort Assinaboine and Poplar River, Mont. 2d, Clayton, Egg Harbor City, Moorestown, N. J.; Quakertown, Pa.; Burlington, Vt. 3d, Kalamazoo, Mich. 4th, Parkston, Dak. 5th, Quakertown, Pa. 6th, Hartford, Conn.; Saint Vincent, Minn.; Fort Custer, Fort Maginnis, and Poplar River, Mont. 7th, Voluntown, Conn.; Bismarck, Fort Buford, Fort Yates, Leach Farm, and Webster, Dak.; Eastport and Orono, Me.; Blue Hill Observatory, Cambridge, and Provincetown, Mass.; Alpena and Marquette, Mich.; Moorhead and Saint Vincent, Minn.; Fort Custer, Fort Maginnis, and Poplar River, Mont.; Nashau, N. H.; Oswego, N. Y.; Burlington and Northfield, Vt. 8th. Rapid City, Dak.; Eastport and Orono, Me.; Saint Vincent, Minn.; Poplar River, Mont. 9th, Smithland, Iowa; Eastport, Gardiner, and Orono, Me.; Saint Vincent, Minn.; Poplar River, Mont. 10th, Parkston, Dak. 12th, Saint Vincent, Minn. 15th, Saint Vincent, Minn. 18th, Parkston, Dak.; Nashau, N. H. 20th, New Haven, Conn.; Leech Farm, Dak.; Amana, Clinton, Cresco, Dubuque, Maquoketa, Monticello, and Osage, Iowa; Eastport, Gardiner, and Portland, Me.; Blue Hill Observatory, Boston, Cambridge, and Provincetown, Mass.; Grand Haven, Lansing, and Thornville, Mich.; Saint Vincent, Minn.; and Poplar River, Mont.; Manchester and Nashua, N. H.; Moorestown, N. J.; Buffalo, Ithaca, Lyons, Oswego, Rose, and Setauket, N. Y.; Elyria, Bellevue, Garrettsville, Sandusky, Tiffin, Toledo, Wauseon, and Yellow Springs, Ohio; Erie, Catawissa, State College, and Wellsborough, Pa.; Burlington, Vt.; Beloit, Delavan, Deuster, and La Crosse, Wis. 21st, Kent's Hill, Me.; Poplar River, Mont.; Albany and Ardenia, N. Y.; Dyberry and Erie, Pa. 22d, Atlantic City, N. J.; Detroit, Mich. 27th, Fort Maginnis, Mont. 28th, Parkston, Dak.; Traverse City, Mich. 29th, Parkston, Dak.; Lyons, N. Y.; Milwaukee, Wis. 30th, Windsor, Ill. 31st Saint Vincent, Minn.

MISCELLANEOUS PHENOMENA.

DROUGHT.

Limona, Hillsborough Co., Fla., 3d: vegetation is suffering greatly for rain.

Savannah, Ga., 4th: no rain has fallen since April 23d, when a slight thunder shower occurred, and vegetation is suffering. Previous to the rains of the 9th drought prevailed in this section, causing injury to vegetation in general.

University, Miss.: the rains of the 4th and 5th were of great benefit to crops, which had been suffering seriously from drought.

Augusta, Ga., 7th: on account of the prevailing drought the oat crop has been seriously injured; cotton and truck farming interests have also sustained some injury. Rain fell on the 8th, and though very light, it was of great benefit.

The voluntary observer at Prospect, Bermuda Island, reports that the total precipitation for May, 0.63 inch, was the least recorded in that month during the last nine years; the next smallest amount in May, being 2.37 inches.

FOREST AND PRAIRIE FIRES.

Chatham, Barnstable Co., Mass., 9th: a forest fire destroyed much valuable woodland in the vicinity of South Brewster, in this county.

Prairie fires are reported to have occurred at Moorhead, Minn., on the 1st, 4th, 8th, 15th, 18th, and at Saint Vincent, Minn., on the 10th.

HALOS.

The dates on which solar halos were observed over the greatest extent of territory during May were the 6th, 17th, 21st, and 23d; they were least numerous on the 7th, and from the 13th to 15th. They were observed on from ten to fourteen dates in Dakota, Kansas, New York, Tennessee, and Washington Territory; Dakota reporting the maximum. None were reported from Arkansas, Florida, Louisiana, Missouri, New Mexico, and Rhode Island.

Between the 1st, and 16th, and from the 26th to 31st, very few lunar halos were reported, there being eight days of the first named interval on which none were recorded; from the 17th until 25th, inclusive, they were quite numerous, being observed in twenty-two states or territories on the 21st. They were seen on from six to eleven days during the month in Arizona, California, Iowa, Kansas, Pennsylvania, Texas (maximum), and Virginia. None were reported from Georgia, Idaho, Indian Territory, Maine, Michigan, New Mexico, Rhode Island, Utah, Washington Territory, and Wyoming.

The Chief Signal Officer has received through the Honorable Secretaries of State and War an interesting photograph of a solar corona which was observed at San José, Costa Rica, May 1, 1888, concerning which the United States consul at Costa Rica, who forwarded the photograph to the State Department, reports as follows: "The circle was apparent from 10 a. m. to 1 p. m., and three colors of the rainbow, red, blue, and yellow, showed in the white circle, although not represented in the photograph."

The phases of the moon, Washington mean time, during May, as given in "The American Ephemeris and Nautical Almanac," are as follows: last quarter, 2d, 6h. 38.9m.; new moon, 10th, 8h. 15.3m.; first quarter, 18th, 5h. 57m.; full moon, 24th, 20h. 31.9m.; last quarter, 31st, 19h. 45.1m.; apogee, 9th, 8.1 h.; perigee, 24th, 1.6 h.

METEORS.

Keeler; Cal.: a meteor of extraordinary size and brilliancy was observed on the evening of the 12th at 10.15 p. m. It was first seen in altitude 23° and azimuth 90°, and remained visible for fifteen seconds. It moved in a horizontal line to azimuth 40° where it disappeared behind the Sierra Nevada mountains. The size and brilliancy of the meteor were equal to the full moon, and it left a fan-shaped trail fully 20° in length, which remained visible until the disappearance of the meteor.

Meteors were also observed as follows: 1st, Fort Stanton, N. Mex.; Wauseon, Ohio. 2d, Quakertown, Pa. 3d, Cedar Keys, Fla. 4th, Lead Hill, Ark. 5th, Ithaca, N. Y. 6th, Cairo, Ill.; McMinnville, Oregon. 7th, Cleburne, Tex. 8th, Wilmington, N. C. 11th, Cedar Keys, Fla. 12th, Clear Lake,

Iowa. 17th, Cedar Keys, Fla. 18th, Fort Thomas, Ariz. 19th, Clear Lake, Iowa; Springfield, Mo. 21st, Toledo, Ohio. 28th, Madison, Wis. 29th, Quakertown, Pa. 30th, Cleburne, Tex.

MIRAGE.

Grand Haven, Mich.: mirage was observed over Lake Michigan from 5.25 until 5.50 p. m., 6th, the phenomenon extending from the southeastern shore to the northwestern horizon. Vessels about five miles from shore appeared both in a natural and inverted position. There was about three feet of sea running at the time and the waves were distinctly seen, apparently seventy-five feet above the surface of the Lake. In the southeast the forests along the shore were plainly depicted in the sky in inverted positions, while to the northwest the image, blurred, gave the vessels a phantom-like appearance.

Huron, Dak.: a mirage was observed from 7 to 8 a. m., 14th. Distant objects in all directions appeared very near and elevated; railroad trains were seen moving as on a horizontal column of smoke.

The following is an extract from the Manchester, N. H., "Daily Press" of the 29th:

This wonderful phenomenon of nature was clearly seen from the hills of Dunbarton between 7 and 8 o'clock Sunday morning, 27th. As far as the eye could see from a point in the east, extending southerly to a point due west, the face of the surrounding country was reproduced upon the clouds above the horizon. To see such a large area of mountains and plains, hilltops and valleys, fields, and woodlands, dwellings, and highways, covering hundreds of miles, and, at the same time, their exact counterpart far above the clouds, is a marvelous sight and one to be enjoyed but once in a lifetime.

Port Angeles, Wash., 28th: the city of Victoria and bays and lakes on Vancouver Island, B. C., were distinctly visible throughout the greater portion of the day. Objects appeared very much raised and, at times, standing upon each other. The day was nearly calm and clear.

Mirage also occurred as follows: 1st Yuma, Ariz.; Independence, Iowa. 5th, Leech Farm Dak. 7th, Webster, Dak. 8th, Yuma, Ariz.; Leech Farm and Webster, Dak. 9th, 12th, and 13th, Webster, Dak. 14th, Webster, Dak., and Moorhead, Minn. 15th and 16th, Webster, Dak. 17th, Moorhead, Minn. 18th, Parkston, Dak. 20th, Tribune, Kans. 21st, Parkston, Dak.; Moorhead, Minn. 25th, Webster, Dak. 28th, Marquette, Nebr. 29th, Webster, Dak.; Tribune, Kans. 30th, Salina and Tribune, Kans. 31st, Webster, Dak.

SAND STORMS.

Sand storms were reported as follows: Yuma, Ariz., 4th, 15th, 16th, 20th, 25th; Duluth, Minn., 7th; Rio Grande City, Tex., 14th, 26th; Fresno, Cal., 14th, 30th, 31st; Whipple Barracks, Ariz., 15th; Las Vegas, N. Mex., 15th, 16th, 25th; Willcox, Ariz., 28th.

VERIFICATIONS.

INDICATIONS FOR 33 HOURS IN ADVANCE.

The percentages of verifications of the tri-daily indications for May, 1888, as determined from comparison of succeeding telegraphic reports, are given in the table below.

The predictions for all districts east of the Rocky Mountains for May, 1888, were made by Junior Professor H. A. Hazen, and those for the Pacific coast districts were made at San Francisco, Cal., by 2d Lieutenant J. E. Maxfield, Signal Corps; the verifications for all districts were determined by Junior Professor C. F. Marvin.

Percentages of indications verified, May, 1888.

States.		States.	
Maine	66.68	Kentucky	79.00
New Hampshire	70.39	Ohio	75.77
Vermont	68.03	West Virginia	75.13
Massachusetts	67.32	Indiana	70.71
Rhode Island	71.45	Illinois	77.87
Connecticut	67.65	Lower Michigan	77.29
Eastern New York	69.65	Upper Michigan	69.94
Western New York	76.77	Wisconsin	71.55
Eastern Pennsylvania	70.87	Minnesota*	71.42
Western Pennsylvania	72.61	Iowa	70.84
New Jersey	72.54	Kansas	71.65
Delaware	74.71	Nebraska	76.03
Maryland	69.87	Missouri	74.74
District of Columbia	70.39	Colorado	76.13
Virginia	71.68	Eastern and Southwestern Dakota	75.39
North Carolina	71.16	Southern California*	90.00
South Carolina	73.78	Northern California*	84.94
Georgia	77.00	Oregon*	80.90
Eastern Florida	86.77	Washington Territory*	79.48
Western Florida	75.74	*By elements:*	
Alabama	78.84	Weather	77.95
Mississippi	78.77	Wind	76.03
Louisiana	83.39	Temperature	69.15
Texas	82.81		
Arkansas	83.32	General average	74.24
Tennessee	77.71		

* In determining the general average percentage for the different elements, the Pacific coast states have not been included.

CAUTIONARY SIGNALS.

Of the total number of cautionary and storm signals ordered during May, 1888, it was practicable to determine the justification or failure of thirty-seven; justified, twenty-two, or 59.46 per cent. Of the above, thirty-four were ordered for cautionary signals; number justified, nineteen, or 55.90 per cent. Three storm signals were ordered, all, or 100 per cent., of which were justified. Total number of direction signals ordered, thirty-nine; justified, thirty-four, or 87.18 per cent. Number of signals ordered for easterly winds, twenty-five; justified, twenty-three, or 92.00 per cent. Number of signals ordered for westerly winds, fourteen; justified eleven, or 78.60 per cent. Number of storms without signals, four. Number of signals ordered late, *i. e.*, after the justifying velocity had begun, ten, or 27.03 per cent.

COLD-WAVE SIGNALS.

Total number of cold-wave signals ordered, nineteen; justified, eleven, or 57.90 per cent.

LOCAL VERIFICATIONS.

The following extracts from the published reports of the state weather services for May, 1888, show the percentages of verification of weather and temperature signals for the various states:

Indiana.—La Grange, verification of weather indications, 80 per cent.

Michigan.—Weather and temperature signals are now displayed in one hundred and forty towns in the state, and upon the baggage-cars of twenty-six trains of eight of the principal railroads of the state.

The indications and cold-wave warnings are issued by the Chief Signal Officer and distributed to the different stations through the central office. The indications are issued at 1 a. m., daily, from the Chief Signal Office, Washington, and are for the twenty-four hours from 7 a. m. to 7 a. m.

The percentage of verification of these indications for May is as follows (the verification is taken from reports of displaymen furnished this office monthly): temperature, 75.1 per cent; weather, 85.2 per cent.; temperature and weather, 80.1 per cent.

The percentage of verification of weather predictions for May on the D., G. H., and M. R'y, is 81.7 for weather, and 68.9 for temperature; on the C. & G. T. R'y, weather, 82.7, temperature, 78.3; P. H. & N. W. R'y, weather, 81.7, temperature, 80.0; M. C. R'y, weather, 88.3, temperature, 87.5; G. R. & I. R'y, weather, 86.0, temperature, 79.0; C. & W. M. R'y, weather, 81.3, temperature, 85.0; P. O. & P. A. R'y, weather, 84.0, temperature, 79.7.

No cold-wave warnings were issued during the month.

Nebraska.—The percentages of correct predictions for the state are as follows: temperature; 84.7; weather, 78.1; mean, 87.4.

South Carolina.—The percentages of verifications of the weather and temperature predictions for the state was: weather, 78.6; temperature, 91.3.

Tennessee.—The percentages of verifications of weather and temperature predictions sent daily from the Signal Office at Washington to the various stations in the state were for the state: weather, 82.7 per cent.; temperature, 79.1 per cent.

STATE WEATHER SERVICES.

The following extracts are republished from reports for May, 1888, of the directors of the various state weather services:

The "Alabama Weather Service," P. H. Mell, jr., of the Agricultural and Mechanical College, Auburn, director:

The average temperature for this month was 2°.9 below the normal. A number of cool days occurred about the middle of the month, especially in the northern half of the state. These cool periods were pleasant and not injurious to the growing crops. There was a slight deficiency of rain; but the showers were generally distributed over the state. The precipitation was 0.44 of an inch below the normal. No violent storms were reported from any quarter. The farming operations have made favorable progress and the outlook is generally encouraging.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 70.4; highest monthly mean, 76.6, at Evergreen; lowest monthly mean, 62.8, at New Market; maximum, 96, at Opelika, on the 27th, at Newton, on the 28th, at Evergreen and Greenville, on the 30th; minimum, 35, at Gadsden, on the 15th; range for state, 61; greatest local monthly range, 59, at Gadsden; least local monthly range, 31, at Mobile.

Precipitation (in inches).—Average for the state, 3.94; greatest, 8.71, at Valley Head; least, 0.13, at Pineapple.

Wind.—Prevailing direction, southwest.

The "Arkansas Weather Service," report prepared by W. U. Simons, Signal Corps, Little Rock:

Temperature (in degrees Fahr.).—Monthly mean, 69.3; highest monthly means, 75.7, at Brinkley and Dallas; lowest monthly mean, 62.9, at Conway; maximum, 98.5, at Wellbourne, on on the 26th; minimum, 32, at Monticello, on the 1st; monthly range for state 66.5; greatest local monthly range, 62.0, at Wellbourne; least local monthly range, 26, at Dayton.

Precipitation (in inches).—Average for state, 4.83; greatest 10.10, at Dallas; least, 0.10, at Brinkley.

The "Colorado Weather Service," Prof. F. H. Loud, Colorado Springs, director:

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 48.3; highest monthly mean, 60.6, at Trinidad; lowest monthly mean, 21.3, at Pike's Peak; maximum, 91.7 at Glenwood Springs, on 15th; minimum, 6.7, at Pike's Peak, on the 3d; range for state, 85.0; greatest local monthly range, 55.0 at Glenwood Springs; least local monthly range, 5.1 at Pike's Peak; greatest daily range, 55.0, at Glenwood Springs, on the 15th; least daily range, 2.0 on the 4th, at Climax.

Precipitation, including melted snow (in inches).—Average for state, 2.38; greatest, 5.81, at Julesburg; least, 0.17, at Grand Junction.

Wind.—Prevailing direction, west.

The following is an extract from the May crop report of "Georgia Agricultural Department," Hon. J. T. Henderson, Commissioner:

The drought which set in after the heavy rains of March and the early part of April was brought to a close by copious rains which fell, varying in the different sections of the state, from the 12th to the 22d of May. The season continued good until June 1, many correspondents complaining of too much rain, which interfered with the proper cultivation of crops.

The temperature throughout the greater part of May was rather too low for the healthy development of the cotton plant, and this circumstance, together with the too-abundant rains, has had a somewhat retarding effect on the crop. The seasons and temperature on the first day of June were all that could be desired in every section of the state.

The "Monthly Review of the Illinois Weather Service," Col. Charles F. Mills, Springfield, director:

The temperature was below the average for all parts of the state. There were occasional frosts, one quite severe on the 14th, but no serious damage was done.

The rainfall was the heaviest we have had for several years in the northern and central divisions, but was much less in the southern division than either of the other two. Very heavy rains occurred in many parts of the state, and thunder-storms were very numerous.

The deficiency of the present year continued until the 26th, when it was converted into a surplus in the northern and central divisions of the state, and in some counties of the southern division; but in most of the southern counties the deficiency still continues and considerable more rain is needed.

The following figures will show, in some measure, the unequal distribution of the rainfall during the month. In Chicago the total rainfall was 6.22 inches, which was 2.72 inches above the average for sixteen years, and this amount has only twice been exceeded in that period. At Springfield the total was 8.61 inches, which was 3.88 inches above the average of the past nine years, and has only once been exceeded in amount during that time—in 1882, when it was 10.59 inches. At Peoria it was 2.92 inches above the average of thirty-two years, the total amount for the month being 6.73 inches. At Pekin it was 3.82 inches above the average of six years, the total being 8.71 inches. At Cairo, however, it was different, the rainfall there being being only 3.58 inches, which is 0.37 of an inch below the average of the sixteen previous years. The same condition of things prevailed at Saint Louis, where but 3.31 inches fell, which was 0.24 of an inch below the average of sixteen years.

Several small tornadoes occurred during the month, but fortunately did little damage. One passed east of Freeport on the evening of the 10th, which tore down fences and unroofed some buildings, while the observer at Dwight reports that a large waterspout or funnel-shaped cloud passed eleven miles southwest of that station on the 11th, but did no damage.

The "Indiana Weather Service," Prof. H. A. Huston, of Purdue University, Lafayette, director:

The temperature during the month was cool throughout; the mean temperature was 3° below the normal. The highest temperature occurred on the 11th and 27th nearly everywhere, and the lowest on the 1st and 2d in the northern portion, and on the 15th in the central and southern portions of the state; the latter was accompanied by hoar-frost, and also in several localities by thin ice. The changes from a higher to a lower temperature were only gradual, while sudden changes from a lower to a higher occurred on the 10th and 27th. Light hoar-frosts were quite frequent, but probably did no great injury to vegetation in general.

There fell, during the month, abundant rains in the central and southern portions, but only in few localities in the northern. Very heavy rains fell during the thunder-storms of the 27th and 28th. These thunder-storms were noteworthy, besides their heavy rainfall, by a very energetic and vivid electrical display, and by the absence of violent winds, which only were noted at a few places during the thunder-storms of the 4th, 7th, and 8th.

Although the well distributed and much needed rainfall was sufficient and beneficial to vegetation in general and to crops and pasturage particularly, still the prevalence of cool temperature and frequently obscured sky acted adversely to the maturing and growth of the various crops, and at the end of the month they are not so well advanced and promising as usual.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 60.5; highest monthly mean, 65.8, at Mount Vernon; lowest monthly mean, 55.4, at La Grange; maximum, 91.0, at Princeton, Butlerville, and Fortville, on the 6th, 11th and 27th; the minimum, 28.0, at Richmond, on the 15th; range for state, 50.0; greatest local monthly range, 62.0, at Fortville; least local monthly range, 42.0, at Seymour, Brookville, Connersville and Farmland.

Precipitation, including melted snow (in inches).—Average for the state, 4.04; greatest, 7.79, at Columbia City; least, 1.50, at Marion.

Wind.—Prevailing direction, southwest.

The "Kansas Weather Service," Prof. J. T. Lovewell, Topeka, director:

The mean temperature for the state is below the May average, and the deficiency is most marked in the northeast counties, where it amounts to 4° and upwards. It is less marked in the central-southern connties, being but 1°.2 below the average in Sumner county, but the deficiency increases from here west, and is 2°.6 in Ford county. The average temperature for the eastern division is 63°, for the middle division 63°, and for the western division 59°; average for the state 62°; the average maximum temperature was 88°; average minimum 39°. The temperature conditions were uniform in the middle and eastern divisions, but ranged slightly lower in the western division; the average highest and lowest temperatures being a degree lower, and the mean being four degrees lower than in the other divisions.

The average rainfall for the state was 3.34 inches; for the eastern division it was 3.50; for the middle division, 3.20; and for the western division, 3.03. Of the total amount falling in the state the eastern division received 36 per cent., the middle division 33, and the western 31 per cent. In Wyandotte county there was an average rainfall which extends through Jefferson, Jackson, Pottawatomie, Riley, and Washington counties, while the counties north and east of these received an excess. The counties north of the Smoky Hill River and west of Mitchell and Jewell generally received an average rainfall, as did also the southern tier from Sumner to Cherokee. Throughout the rest of the state a deficiency exists, which is greatest in Shawnee, Wabaunsee, and Morris.

Summary.

Temperature (in degrees Fahr.).—Monthly mean for the state, 62; highest monthly mean, 68, at Grenola; lowest monthly mean, 56, at Eureka; maximum, 94, at Dorrance. Ninnescah, McAllister, and Montero, on the 2d, 20th, and 21st; minimum, 30, at Topeka and Jacksonia, on the 18th and 19th; range for state, 64; greatest local monthly range, 59, at Jacksonia; least local monthly range, 41, at Cawker City; greatest daily range, 55, at McAllister, on the 1st; least daily range, 1, on the 23d, at Waterville.

Precipitation, including melted snow (in inches).—Average for the state, 3.24; greatest, 7.70, at Leavenworth; least, .87, at Topeka.

Wind.—Prevailing direction, south.

The "Louisiana State Weather Service," in charge of R. E. Kerkam, Sergeant, Signal Corps, at New Orleans:

Temperature (in degrees Fahr.).—The mean temperature for May, 1888, for the state of Louisiana was 73°.3, which was 0°.5 below the May normal of past eighteen years. In the northern section of the state, the average temperature for the month was about the normal for that section, the deficiency of one degree occurring in the southern section.

Precipitation (in inches).—The average rainfall for May, 1888, for the state, 5.49, was an excess of 0.31, compared with a May normal of past eighteen years, in which period the May averages were as follows: 1871, 5.08; 1872, 8.49; 1873, 10.68; 1874, 0.52; 1875, 1.71; 1876, 7.60; 1877, 1.48; 1878, 6.02; 1879, 5,57; 1880, 5.29; 1881, 4.37; 1882, 6.57; 1883, 2.84; 1884, 10.85; 1885, 4.14; 1886, 1.37; 1887, 5.16; 1888, 5.49.—Average 5.18. There was an average deficiency of 0.15 in the northern section of the state, the May normal for that section being 4.95. In the southern section there was an average excess of one-half inch, the May normal being 5.58. The heaviest May rainfall on record for north Louisiana is 11.97, in 1884, and in south Louisiana, 18.68 in 1873. The heaviest rainfalls reported during the past month are as follows: Sugar Experiment Station, near Kenner, 11.71; New Orleans, 9.75; Alexandria, 9.25.

Wind.—The prevailing direction for the state was south; for the northern section, south; and for the southern section, southeast.

The "Michigan Weather Service," N. B. Conger, Sergeant, Signal Corps, Lansing, director:

Temperature (in degrees Fahr.).—The mean temperature for May, 52.2 is 4.4 below the normal of thirteen years. The temperature was below the normal in all sections during May. The greatest deviation, 4.8, was for the Upper Peninsula, and the least was 3.1 below the normal in the southern section. The mean daily temperature was below the normal on 21 days and above on nine days. The highest mean daily temperature, 65, occurred on the 11th and 24th, when the temperature was 10 and 4, respectively, above the normal, and the lowest 37, occurred on the 1st and 13th, when the temperature was 11 and 21, respectively, below the normal. The highest mean daily temperature for the past thirteen years, 75, occurred on the 25th, 1880, and the lowest, 36, occurred on the 1st, 1877. The highest mean monthly temperature, 63.7, occurred in 1880, and the lowest, 51.3, occurred in 1882. The maximum temperature, 88, occurred at Corunna on the 22d, and at Hart on the 24th, and the lowest, 18.0, occurred at Hart on the 1st. The mean monthly temperature is but 0.9 above the lowest monthly temperature in the past thirteen years, The mean temperature in 1882 was 51.3, in 1883, 51.5.

Precipitation, including melted snow (in inches).—The average amount of precipitation for May, 3.51, is 0.11 above the normal of thirteen years. The precipitation was below the normal in the northern and southern sections, and above in the Upper Peninsula and central section. The precipitation is in excess in the central counties of the central section, Marshall showing an excess for May of 2.43 from an eight years' normal, while at Lansing there is an excess of 0.23. The greatest deficiency occurs in the southeastern part of the state, the deficiency at Detroit being 1.62, and at Adrian 1.20. Stations on the east and west borders of the state show a deficiency for May of from 0.31 at Grand Haven, to 0.86 at Port Huron. The largest monthly rainfall, 6.15, was recorded at Colon, Saint Joseph Co., and the least, 1.80, at West Branch, Ogemaw Co. General rains occurred on the 7th, 8th, 12th, 18th, 26th, 27th, 28th, and 31st. Heavy rainfall was recorded on the 12th, 27th, and 28th. Twenty-two stations record a rainfall of 1.00 inch or more on the 28th, and at Berrien Springs, Berrien Co., there was recorded 3.04 that fell on the 27th and 28th. Comparing the total rainfall for this month with the records of twelve years, it is found that the largest monthly rainfall, 6.54, occurred in 1883, and the least, 1.46, in 1877. The rainfall for May, 1887, was 2.36.

The "Minnesota Weather Service," Prof. W. W. Payne, Northfield, director:

Temperature (in degrees Fahr.).—During the month the weather has been unusually cold over the entire state. The temperature ranged from 9.0 below the normal of seventeen years over southern Minnesota to 6.0 below in northern Minnesota. The average temperature for the state was 48.8, this is 12.9 colder than that of the corresponding month of last year, 9.9 colder than that of 1886, and 6.0 colder than that of 1885. At Minneapolis it was the coldest May with one exception, (48.6, May, 1867) since 1865. At Saint Paul, La Crosse, and Duluth it was the coldest May since observations were commenced in 1871. In the past sixteen years at Saint Vincent the temperature was but once lower than that of this month, namely, in 1883, when it was nearly a degree colder. There was a comparative absence of noticeably cold weather, but the temperature remained steadily low throughout the entire month, especially during the first twenty days. The range of temperature for the state was only 68.0, this is somewhat less than that of May for the previous three years. The warmer portion of the month was from the 20th to 31st; the maximum temperature occurred generally in the southern counties on the 22d or 23d, and in the northern on the 26th. The highest temperature recorded throughout the state was 81.0 at Spring Valley on the 23d, while at Medford and Grand Meadow it was 80.0 on the preceding day. A great contrast is noted between the maximum temperature for the state in May of last year, when 96.0 was recorded at Saint Vincent, and this year when it was only 81.0. The average of the maximum temperatures of that month was 90.1, while of this it is only 76.1. The minimum temperature for the month was 12.0, and recorded at Pokegama Falls Dam on the 1st; at Saint Vincent, the next lowest temperature, which was 14.4, occurred on the 17th.

Precipitation (in inches).—The average for the state was 5.02; this is from three to three and a half inches above the amount which fell during the corresponding months of 1885, 1886, 1887. The precipitation has been very unequally distributed, as in the northwestern portion of Minnesota there was a deficiency, while elsewhere throughout the state there was considerable of an excess. The greatest departure below the normal was 2.73, at Saint Vincent, while the greatest departure above was 3.23, at La Crosse. At Saint Paul there was 1.57 more than the usual amount, while at Duluth it was only 0.30 above. Nearly all of the precipitation occurred during the periods of the 2d to 4th (inclusive), 6th to 11th, 17th to 18th, 20th to 24th, 26th, 27th, 30th; on the other days there was a comparative absence of rain. The average number of rainy days in northern Minnesota was about nineteen, while in northwestern Minnesota there were about six. The amount of snow which fell during the month was but very light, the greatest quantity reported as having fallen was two inches at Pine River Dam and Delano. The precipitation at Minneapolis is greater than that of any other May in twenty-three years, while at La Crosse it is the greatest in sixteen years. At Saint Vincent it is the smallest amount recorded in sixteen years.

Wind.—The prevailing direction for the month was from the northwest.

The "Mississippi Weather Service," Prof. R. B. Fulton, of the University of Mississippi, Oxford, director:

The monthly mean temperature, 72°, is 2° below the mean for May, 1887. The highest temperature reached during the past month was 98°, which occurred at Columbus on the 27th. The lowest temperature, 41°, occurred at Hernando on the 1st.

The average rainfall, 3.60 inches, is 0.55 inch in excess of the average for this month last year. Average number of days on which rain fell, 9.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 72.0; highest monthly mean, 75.0, at Natchez, Pearlington, and Tupelo; lowest monthly mean, 69.0, at Memphis and Batesville; maximum, 98.0, at Columbus, on the 27th; minimum, 41.0, at Hernando, on the 1st; range for the state, 57.0; least local monthly range, 28.0, at Tupelo; greatest local monthly range, 51.0, at Columbus, Waynesborough, and Hernando; greatest daily range, 40.0, at West Point, on the 13th; least daily range, 3.0, on the 24th, at Palo Alto.

Precipitation (in inches).—Average for state, 3.60; greatest, 9.58, at Biloxi; least, 0.71, at Hazlehurst.

The "Missouri Weather Service," Prof. Francis E. Nipher, of Washington University, Saint Louis, director:

The average temperature for May was 61°.7; the highest reported was 93°, at Pro Tem, and the lowest was 30°, at Ironton. The average of maximum temperatures was 85°.5, and the average of minimum temperatures 36°.9, making an average monthly range of 48°.6.

The average precipitation was 5.43 inches, which was 1.38 inches above the normal for May. The greatest amount reported was 13.40 inches at Mound City, and the least, 1.38 inches at Warrensburg.

The "Nebraska Weather Service," Prof. Goodwin D. Swezey, of Doane College, Crete, director:

The month has been cool but with small extremes of temperature, and with heavy rainfall, especially throughout the northern part of the state.

Summary.

Temperature.—The mean temperature for April, 1888, which was 56°.6 in southeastern Nebraska, being the highest for ten years, was followed by a mean for May of only 57°.4, the lowest for six years, so that the latter month has not been essentially warmer than the former. The highest temperature of the month, 84°.5, is the lowest maximum for nine years; the minimum, 27°, is not especially low.

Precipitation.—The rainfall for May is distributed over an area stretching across the northern half of the state and extending down through the middle to the south line; and another area in the southeastern portion of the state, which has received from 5.00 to over 9.00 inches, reaching a maximum in the region of the middle Niobrara. The regions of least rainfall are extreme southwestern corner and the lower parts of the Loup and Elkhorn valleys, the minimum being 3.50 inches at Palmer.

The "Nevada Weather Service," Prof. Charles W. Friend, Carson City, director:

The weather for May was generally cloudy, cool and windy, not very favorable to growing crops, although the rainfall, which for the month of May in Nevada is extremely variable, was this year much above the average. Owing however to the great deficiency of precipitation in the last few months, both agricultural and grazing interests have suffered heavy loss, and on account of the small amount of snowfall upon the mountains in the winter months many of the streams are so low that water cannot be obtained for the irrigation, so that in some sections of the state the crops will be almost a total failure.

Temperature (in degrees Fahr.).—The mean temperature for the month was 56.7, or about 0.5 below the normal; the highest temperature, 87.0, occurred on the 12th; and the lowest, 27.8, on the 2d.

Precipitation (in inches).—The total precipitation was 1.05, or 0.76 of an inch above the normal. Rainfall occurred on eleven days; on four days the amount was inappreciable. The heaviest precipitation occurred on the 14th and 15th, the amount for these two days being 0.80. No snowfall occurred this month. A small amount of hail fell on the 14th and 24th. The defi-

ciency of precipitation since January 1, 1888, is 3.43; and since September 1, 1887, 5.21.

The "New England Meteorological Society," Prof. Wm. H. Niles, of the Institute of Technology, Boston, Massachusetts, president:

General Conditions.—The month can be conveniently divided into four periods, viz., 1st–7th, 8–19th, 20th–23d, 24th–31st. (1) In the first period two cyclones influenced the weather; the first has already been described in the April bulletin as moving into the ocean south of New England on April 30th. It caused light rain and snow on the 1st and 2d. Two days of cool fair weather followed, when the second depression, moving from the Lakes into upper Canada on the 4th, caused rains on the 5th and 6th, which were succeeded by fair weather on the 7th. (2) The second period, including twelve days, was characterized by an unusual succession of rainy days which resulted from the movements of five distinct depressions. The first advancing in Illinois on the 8th was dissipated over Wisconsin on the 9th, while the second, with central pressure 29.3 inches, advanced in the northwest. The latter moved into Upper Canada on the 11th, while a third depression moved from Texas northeasterly into Canada on the 12th. The fourth depression seems to have formed in the Atlantic on the 12th, to have remained nearly stationary off Long Island on the 13th and 14th, and on the 15th to have moved northeasterly. On the 16th and 17th the fifth depression was forming in the southwest, and on the 18th and 19th it passed from Missouri to the Lakes and down the Saint Lawrence Valley. As a result of this succession of cyclones, none of which crossed New England, cloudy and rainy weather prevailed, with occasional fair skies for a few hours, especially on the 16th and 17th. The rains were heaviest on the 11th and 12th, and the pressure was a little below the normal during most of the time. (3) The high area following the last-named cyclone lingered over New England for several days, and fair weather prevailed over the whole district from the 20th to the 23d. (4) From the 24th to the 31st, cloudy weather again prevailed, especially in the southern portion of New England, and a second succession of rainy days with occasional intervals of fair skies occurred, due to the movements of three depressions. The first of these was a lingering cyclone of moderate intensity, which moved from Nebraska to the Lakes between the 22d and 26th. It was followed by the second, which moved with more energy from the Indian Territory down the Saint Lawrence Valalley, between the 26th and 29th. The pressure did not rise to the normal after its passage however, and on the 31st, the third depression of this period moved up the Atlantic along the New England coast. In all these depressions the central pressure was about 29.6 inches.

Summary.

Temperature (in degrees Fahr.).—Monthly mean 53.6 (90 stations); highest monthly mean, 58.4, at Hartford; lowest monthly mean, 45.3 at Eastport; maximum, 88, at Lawrence, Olneyville, and Providence, on the 29th; minimum, 18, at Berlin Falls, on the 3d; range for New England, 70; greatest local monthly range, 61, at Berlin Falls; least monthly range, 33, at Nantucket; greatest daily range, 48, at Plymouth (N. H.), on the 22d; least daily range, 1, at Woonsocket, on the 28th.

Precipitation, including melted snow (in inches).—Average for New England, 4.49 (117 stations); greatest, 8.12, at Nantucket, least, 1.46, at Berlin Mills.

Wind.—Prevailing direction, northeast (21 stations).

The "New Jersey Weather Service," Prof. George H. Cook, of the Agricultural College, New Brunswick, director:

The extraordinary character of the month is shown by its record of cloudy and rainy days, and also in the comparative table of precipitation. It was a phenomenal month and will hold a prominent place in the meteorological records of the state for years to come. The agriculturalist, too, will also have cause to remember it; it was so disastrous to the crops, especially to cherries, plums, and peaches.

Temperature (in degrees Fahr.).—Monthly mean, 52.4; highest monthly mean, 63.0, at Bridgeton; lowest monthly mean, 55.1, at Atlantic City; maximum, 91.0, at Oceanic, on 29th; minimum, 26.0, at Hanover, on the 3d; range for state, 65.0; greatest local monthly range, 59.0, at Locktown; least local monthly range, 30.0, at Ocean City; greatest daily range, 47.0, at Bordentown, on the 5th; least daily range, 2.0, at Oceanic, on the 23d.

Precipitation, including melted snow (in inches).—Average for the state, 4.92: greatest, 6.48, at Egg Harbor City; least, 3.00, at Locktown.

Wind.—Prevailing direction, east.

The "North Carolina Weather Service," Dr. Herbert B. Battle, of Raleigh, director:

Nearly all crops were injuriously affected during the month. Wheat and oats will be far below the average yield. In Edgecombe and the adjoining counties of Pitt, Beaufort, and Lenoir, the cotton crop will be almost a complete failure, caused by the excess in rainfall.

Temperature (in degrees Fahr.).—Mean for May, 68.0; departure from the normal, +1.5; highest observed, 96.0, occurred at Chapel Hill, on the 28th; lowest observed, 33.0, occurred at Marion, on the 2d; range for the state, 63.0; highest monthly mean, 73.9, occurred at Southport; lowest monthly mean, 64.0, occurred at Lynchburg, Va.; average monthly range, 46.4; greatest monthly range, 55.0, occurred at Marion; least monthly range, 27.8, occurred at Hatteras; average daily range, 18.5; greatest daily range, 20.4 occurred at Cheraw, S. C.; least daily range, 10.8, occurred at Hatteras,

Precipitation, including melted snow (in inches).—Average for May, 1888, 6.89; departure from the normal, +3.48; greatest monthly rainfall, 13.99, occurred at Marion; least monthly rainfall, 3.46, occurred at Southport.

The "Ohio Meteorological Bureau," Prof. B. F. Thomas, of the Ohio State University, Columbus, president; Charles E. Kilbourne, Secretary:

Temperature (in degrees Fahr.).—The mean temperature for the northern and middle sections, 56 and 59.2, respectively, are each 1.7, and the mean for the southern section, 61.8, is 1.3 below the mean for the past six years. The mean for the state, 59.1, is 2.1 below the average. The maximum temperature, 91, occurred at Pomeroy on the 3d, and at Georgetown on the 11th. The minimum temperature was 23, at Wauseon on the 3d. Killing frost was reported on the 17th by Newcomerstown, Wooster, and New Alexandria, and on the 20th by Canton and North Lewisburg. Light frost was reported by stations in northern and middle sections on the 13th, 14th, 17th, 19th, 20th and 21st, and by stations in the southern section on the 5th, 15th, 17th and 20th. The mean daily range of temperature, 21.8, the lowest mean range for the month of May. The greatest daily range was 50, at Pomeroy, on the 2d, and the least, 2.8, at McConnellsville, on the 1st.

Precipitation, including melted snow (in inches).—General and heavy rains occurred in all sections on the 4th, 8th, 18th, 25th, 27th and 28th, general, though mostly light, rains in all sections on the 1st, 10th, 12th, 29th and 31st. The greatest rainfall in any twenty-four hours, 3.14, occurred at the Ohio State University between the 7 a. m. observations of 8th and 9th. The mean rainfall in the northern section was 3.30, in the middle section 4.40, and in the southern section 3.60. The mean for the state was 3.77. These means are all below the average, the deficiency in the northern section being 0.55, in the middle section 0.04, and in the southern 0.45. The mean for the state is 0.34 below the average, making the deficiency for the year to June 1st 2.35. Thunderstorms were general throughout the state on the 4th, 8th, 9th, 18th, 27th, 28th and 31st.

"Oregon Weather Service," report prepared by B. S. Pague, Sergeant, Signal Corps, Roseburg, Oregon:

The month of May gave to the coast, Umpqua, and Williamette valleys, and Columbia River basin, warm, dry weather. In southern and eastern Oregon the temperature was nearly normal; in the former the precipitation was above the normal, in the latter nearly normal.

Temperature (in degrees Fahr.).—The mean temperature of the state for May was 58, which is about 2 above the normal. Along the coast the temperature was slightly above the normal. In the Williamette and Umpqua valleys all along the Columbia River it was from 2 to 5 above the normal, and in southern and eastern Oregon it was below the normal. Walla Walla reports the highest mean temperature, 65, and Fort Klamath the lowest, 50; in the interior valleys Portland has the highest mean, 62, Eola the lowest, 59.

Precipitation (in inches).—The precipitation was below the normal along the coast; in the Williamette and Umpqua valleys, from 0.64 at Roseburg to 2.30 at Fort Canby. In southern Oregon it was from 0.5 above the normal. In eastern Oregon it was nearly normal. In southern Oregon the precipitation amounted to over 2.00, in eastern Oregon less than 1.00, in the Umpqua and Williamette valleys and along the coast it amounted from a few hundredths to over 1.00, and Cresswell, Lane Co., reports 3.68 of rain; this is the largest amount reported in the state, and east Portland reports .04, the least amount in the state. For the season from 48.0 to 64.0 have fallen along the coast, from 34.0 to 41.0 in the Williamette valley, 28.0 in the Umpqua valley, 16.0 in the Rogue River valley, from 10.0 to 20.0 in the Lake country, and from 6.0 to 15.0 in eastern Oregon.

Wind.—The winds were generally from west to north.

The "Pennsylvania State Weather Service," report prepared under the direction of the Franklin Institute, Philadelphia, by Sergeant T. E. Townsend, Signal Corps:

Temperature (in degrees Fahr.).—The mean temperature of May, 1888, 57.6, is about 3 less than the May average. This departure, together with the deficiency that existed at the beginning of the month, and the unusual number of rainy and cloudy days and cold nights, has increased the lateness of the season, and the growth of vegetation is correspondingly backward.

The lowest reported temperatures were Coudersport, 23.5; Drifton, 24; Dyberry, 24; and Phillipsburg, 24. The highest were Phillipsburg, 91; Johnstown, 90; Coatesville, 89; York, 87.5; Kutztown, 87.3; Altoona and Pottstown, 87. The cold periods of the month were on the 3d and 17th, and the warmest on the 28th and 29th. A killing frost occurred on the 17th, which was general throughout the state. Considerable damage was done by it to fruit and tender vegetables.

Precipitation (in inches).—Rains were of almost daily occurrence, the 6th, 20th, 21st, and 22d being the exceptions. The total average, 4.24, gives an excess of about 1.10. The central part of the state received the greater portion. Huntingdon reports 8.41; Girardville, 7.08; Drifton, 5.69; Chambersburg, 5.55; and Carlisle, 5.14; while Erie had but 2.26; Wysox, 2.31; Bethlehem, 2.33; and Meadville, 2.56. The heavy rains occurred on the 9th, 18th, and 28th. The latter, in many places, was attended by severe hail storms. Several stations report a light snowfall on the 15th.

Wind.—Prevailing direction, west.

The "South Carolina Weather Service," Hon. A. P. Butler, Com'r of Agriculture for South Carolina, Columbia, director:

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 70.2; highest monthly mean, 73.8, at Orangeburg; lowest monthly mean, 65.4, at Spartanburg; maximum, 99, at Orangeburg, on 28th; minimum, 33, at Cedar Springs on the 15th; range for state, 66.0; greatest local monthly range, 60.0, at Cedar Springs; least local monthly range, 30.0, at Timmonsville; greatest daily range, 45.0, at Winnsborough, on the 17th; least daily range, 0, on the 10th at Clinton.

Precipitation, including melted snow (in inches).—Average for the state, 7.51; greatest, 11.55, Spartanburg; least, 4.61, at Timmonsville.

The following is an extract from the report of the "Meteorological Department of the State (Tennessee) Board of Health," prepared under direction of J. D. Plunket, M. D., President of the State Board of Health, by H. C. Bate, Signal Corps, Assistant, Nashville:

The meteorological conditions for May show but few departures from the normal of the past six years. The principal feature was the period of low temperature about the 15th, culminating in a heavy frost in most parts of the state. There were no very high winds, and only one severe electric storm, which was rather local in its character, except as to the rain accompanying it. The percentage of cloudiness was above the normal.

The mean temperature was 65°.7, very nearly the normal for the past six years. The highest local mean was 70°.2, recorded at Bolivar, and the lowest 60°.3, recorded at Fostoria. The highest temperature was 90°.0, recorded on the 26th, and was the lowest May maximum recorded during the past six years, except in 1884, when it was the same, the highest being 94°.0 in 1885. The lowest temperature was 30°.0, recorded on the 15th, and was the lowest by three degrees during the period named, and the same as the April minimum. The days on which the maximum temperature was recorded were the 11th, 26th, 27th, and 28th. The minimum temperature was recorded on the 15th, generally in the eastern and middle divisions, and on the 1st, 2d, and 14th in the western division, and at a few stations in the middle division. The daily ranges of temperature were very nearly the normal.

The mean precipitation was 3.72 inches, slightly below the May mean for the past six years, and the least during that period, except in 1884 and 1887. Of this amount, the eastern division received an average of nearly five and a half inches, the middle division a little more than three inches, and the western division about two and a half inches. The rains during the month were at most of the stations frequent, but generally light, the heaviest fall being reported at Chattanooga on the 30th, measuring 2.45 inches; the next heaviest was 1.70 inches, reported at Riddleton on the 24th, 1.68 inches at Parksville on the 31st, and 1.65 inches at Fayetteville on the 18th. The rain of the 24th at Trenton was perhaps the heaviest in the state during the month, 1.45 inches falling in one hour. There were a few other stations where more than an inch of rain in twenty-four consecutive hours was reported. The frequency of the rains in various parts of the state can be imagined from the fact that only two days during the month were reported as without measurable rainfall at any of the stations, and on one of these a trace or sprinkle was recorded. These days were the 26th and 27th. The greatest monthly rainfall was 8.00 inches, reported at Newport, and the least, 1.90 inches, at Milan. Hail fell at a few stations. Dews were reported at various stations on eighteen days, and frosts on four days, the last, on the 15th, being a killing frost at many stations, especially in the eastern and middle divisions.

Table showing monthly and annual mean temperatures at Philadelphia, Pa., from observations furnished by Dr. J. R. Coxe, Chas. Peirce, James Young, Dr. Thos. Hewson, Journal Franklin Institute, A. D. Bache, Dr. Conrad, Prof. J. A. Kirkpatric, and the Signal Service.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1758 ...	37.2	32.2	38.6	53.3	63.5	72.1	75.7	71.3	64.0	56.7	44.0	34.5	53.6
1759 ...	30.0	38.4	41.4	49.4	62.4	71.6	73.0	69.7	65.2	55.3	46.4	30.4	52.7
1767 ...	31.7	32.5	41.0	51.0	61.6	71.2	74.0	75.5	64.5	54.0	46.7	35.3	53.3
1768 ...	28.0	46.0	39.5	46.0	59.0	68.6	71.5	65.7	64.0	50.0	42.0	37.7	51.5
1769 ...	33.0	32.0	42.0	50.0	57.0	68.0	77.0	74.0	64.0	55.0	38.0	32.0	51.8
1770 ...	30.5	37.5	38.5	48.5	57.5	70.0	73.5	71.5	64.0	52.5	46.5	33.5	52.0
1771 ...	36.0	29.0	41.0	53.0	58.0	67.0	71.0	73.0	63.0	53.0	48.0	30.0	51.8
1772 ...	32.5	40.5	30.0	51.0	56.0	67.0	75.0	77.0	64.0	55.5	45.5	36.5	52.6
1773 ...	32.6	33.7	42.1	52.2	62.7	73.4	79.6	76.0	63.9	58.2	42.2	39.9	54.7
1774 ...	27.0	32.4	43.1	54.6	60.1	67.8	72.8	73.7	63.7	59.3	44.1	36.4	52.9
1775 ...	35.6	41.2	45.3	51.4	65.8	68.3	75.1	72.8	65.6	54.6	41.4	35.7	54.4
1776 ...	32.7	34.2	42.2	51.0	59.9	69.9	74.2	72.8	67.3	55.9	46.3	35.3	53.5
1777 ...	31.0	31.6	40.3	52.2	57.1	70.4	70.6	75.9	59.2	50.0	39.5	33.7	51.0
1790 ...	44.0	32.0	38.0	50.0	56.0	70.0	78.0	74.0	66.0	50.0	40.0	30.0	52.3
1791 ...	30.0	28.0	40.0	54.0	58.0	74.0	80.0	75.0	64.0	52.0	41.0	32.0	52.3
1792 ...	32.0	30.0	37.0	52.0	58.0	72.0	77.0	76.0	63.0	50.0	40.0	30.0	51.4
1793 ...	40.0	32.0	34.0	46.0	62.0	76.0	81.0	74.0	70.0	64.0	38.0	30.0	53.9
1794 ...	32.0	31.0	36.0	44.0	61.0	70.0	73.0	71.0	62.0	50.0	40.0	31.0	50.1
1795 ...	30.0	30.0	34.0	50.0	68.0	70.0	78.0	70.0	64.0	52.0	41.0	30.0	51.4
1796 ...	30.0	28.0	38.0	48.0	64.0	72.0	75.0	72.0	68.0	50.0	43.0	32.0	51.7
1797 ...	28.0	26.0	36.0	46.0	64.0	73.0	76.0	74.0	66.0	55.0	40.0	30.0	51.2
1798 ...	33.1	32.3	43.2	53.0	65.7	74.1	76.4	81.6	67.8	58.2	41.1	31.5	54.8
1799 ...	33.7	32.9	38.8	54.2	61.1	71.9	76.2	74.5	67.2	55.0	46.4	33.7	53.8
1800 ...	31.8	31.4	38.7	55.9	61.3	71.0	76.2	73.4	66.6	54.9	40.7	36.8	53.2
1801 ...	31.2	34.5	44.4	49.0	64.6	70.9	76.4	72.8	69.1	56.5	42.0	35.7	53.9

Monthly and annual mean temperatures at Philadelphia.—Continued.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1802 ...	40.8	34.5	42.3	52.9	59.4	71.8	74.7	74.5	67.2	59.9	45.6	33.3	54.7
1803 ...	32.9	36.3	41.9	54.2	58.9	73.0	78.0	75.7	65.9	57.9	43.2	40.6	54.9
1804 ...	29.6	34.0	38.7	50.9	63.8	70.3	76.9	76.5	72.8	57.3	46.9	32.6	54.2
1805 ...	29.0	29.0	40.0	52.0	63.0	71.0	73.0	70.0	66.0	52.0	44.0	30.0	51.6
1806 ...	30.0	28.0	38.0	47.0	67.0	70.0	73.0	69.0	64.0	55.0	45.0	32.0	51.5
1807 ...	32.0	33.3	39.0	52.5	62.3	70.0	75.0	75.5	68.8	60.2	42.5	43.0	54.5
1808 ...	33.2	41.0	48.8	60.7	67.0	81.0	81.0	80.7	72.2	59.5	47.8	39.3	59.4
1809 ...	29.8	33.7	42.8	57.3	67.5	78.5	78.2	76.8	71.8	66.3	43.2	40.5	57.2
1810 ...	34.0	39.0	42.7	61.0	72.0	78.0	79.3	78.0	73.7	58.8	45.0	36.5	58.2
1811 ...	34.5	33.8	53.8	56.7	66.0	76.3	84.7	79.7	74.0	65.2	49.0	37.0	59.2
1812 ...	31.0	36.7	45.0	58.3	64.0	79.0	83.0	79.5	70.0	59.3	46.3	37.2	57.4
1813 ...	31.5	33.3	45.0	60.0	67.3	83.5	81.3	82.8	76.0	57.3	47.5	35.0	58.4
1814 ...	32.7	38.7	43.0	59.8	70.7	77.5	82.0	79.7	73.5	60.2	48.7	35.0	58.5
1815 ...	34.8	32.2	47.8	57.5	65.5	78.2	86.5	81.5	71.8	60.5	50.3	35.5	58.5
1816 ...	30.7	40.0	44.7	57.2	67.0	75.0	76.7	79.5	70.0	60.5	49.5	39.5	57.5
1817 ...	31.0	27.3	45.0	61.0	68.3	74.0	80.8	79.5	72.7	57.5	50.2	37.0	57.0
1818 ...	33.0	30.2	45.5	53.8	65.5	80.8	82.7	79.2	70.8	59.8	51.5	32.7	57.1
1819 ...	36.0	39.3	40.3	59.1	66.2	81.9	84.4	83.5	75.8	58.0	50.7	35.6	59.2
1820 ...	30.0	43.8	46.5	46.8	66.2	80.6	86.4	83.4	76.0	58.1	44.1	34.5	58.0
1821 ...	25.0	40.0	45.5	54.8	69.5	81.5	82.1	84.9	75.5	61.3	45.6	43.3	58.3
1822 ...	30.0	38.5	48.5	56.7	74.0	80.0	84.4	82.6	82.6	64.1	53.1	36.1	60.9
1823 ...	34.8	29.6	44.7	61.1	69.6	78.8	81.5	81.9	71.5	58.6	43.0	38.4	57.7
1824 ...	39.8	34.6	44.9	54.7	64.4	78.4	83.6	79.5	71.9	61.6	47.7	40.9	58.5
1825 ...	36.7	38.3	51.1	60.4	71.4	82.9	85.4	82.2	73.7	66.0	48.5	36.8	61.1
1826 ...	34.4	39.4	48.1	54.3	78.5	82.0	85.2	82.7	75.6	63.5	48.6	37.5	60.8
1827 ...	28.0	27.0	36.0	50.0	62.0	71.0	75.0	70.0	64.0	46.0	38.0	36.0	50.2
1828 ...	39.0	40.0	42.0	56.0	65.0	77.0	80.0	76.0	65.0	56.0	42.0	38.0	56.3
1829 ...	30.0	25.0	35.0	51.0	64.0	70.0	72.0	61.0	61.0	52.0	43.0	43.0	50.6
1830 ...	33.0	30.0	41.0	53.0	63.0	68.0	76.0	72.0	64.0	54.0	50.0	37.0	53.4
1831 ...	25.3	26.3	44.2	51.9	62.5	74.4	73.3	74.3	65.8	55.5	41.6	22.2	51.4
1832 ...	30.3	33.8	42.1	48.0	581.	68.7	73.1	71.7	63.1	53.0	43.8	34.7	51.5
1833 ...	33.2	30.4	36.2	52.5	66.7	65.7	72.6	69.4	63.6	50.4	39.5	34.2	51.2
1834 ...	28.2	39.3	41.6	50.5	59.6	68.2	77.4	73.5	64.1	49.3	39.8	32.3	52.0
1835 ...	29.8	25.3	37.1	48.6	60.6	68.9	72.5	68.6	58.5	56.2	44.2	28.8	49.9
1836 ...	29.9	22.9	33.4	48.1	62.9	65.1	72.9	68.0	66.1	46.4	39.4	31.0	48.8
1837 ...	28.8	31.0	37.7	46.4	60.4	68.1	71.4	69.9	61.5	53.2	44.4	33.8	50.6
1838 ...	35.8	23.2	40.6	45.5	57.6	72.2	78.5	73.6	66.1	49.7	39.8	28.8	51.0
1839 ...	29.5	32.4	36.0	53.4	62.2	65.8	73.6	70.0	64.0	56.0	40.0	34.0	51.4
1840 ...	24.0	39.0	44.0	55.5	61.0	67.9	72.1	71.6	59.1	53.5	41.7	28.5	51.5
1841 ...	31.3	27.6	38.4	46.0	56.7	71.1	72.9	71.6	66.2	48.0	41.3	34.8	50.5
1842 ...	34.9	38.3	46.0	51.6	57.9	66.5	73.3	70.3	63.7	51.8	38.2	32.1	52.0
1843 ...	39.1	26.6	29.7	49.8	57.5	69.0	72.0	72.9	66.4	50.4	40.0	33.6	50.6
1844 ...	26.6	32.2	41.9	54.3	63.3	68.1	73.6	71.1	64.9	52.6	42.5	34.2	52.1
1845 ...	36.6	33.2	43.1	51.3	59.0	70.4	76.0	74.0	65.0	56.0	46.0	28.5	53.3
1846 ...	33.3	29.5	42.7	53.2	64.0	68.8	74.5	74.8	70.8	55.3	49.5	35.8	54.4
1847 ...	32.3	33.2	38.7	51.2	61.8	70.5	76.5	73.5	66.0	54.0	48.3	39.5	53.8
1848 ...	36.7	23.6	39.4	54.4	65.8	73.4	74.8	74.5	64.5	56.2	41.0	43.2	54.0
1849 ...	29.4	27.5	42.5	50.6	58.4	73.5	74.7	74.4	64.4	55.3	51.5	34.4	53.0
1850 ...	35.8	37.1	39.5	48.1	57.7	71.9	77.4	73.0	66.9	56.0	48.0	36.5	54.0
1851 ...	35.2	39.8	43.5	52.0	62.6	70.4	78.6	74.2	69.0	58.6	43.6	30.2	54.8
1852 ...	26.5	33.8	41.2	47.3	64.3	72.9	78.0	74.1	67.3	58.8	42.5	41.7	54.0
1853 ...	33.2	37.8	42.8	53.4	64.3	75.3	76.6	75.7	68.5	53.9	48.4	35.3	55.4
1854 ...	32.9	34.8	43.2	51.4	65.3	73.3	80.3	76.6	70.2	59.2	46.1	31.3	55.4
1855 ...	34.3	26.7	38.8	52.9	63.8	71.9	79.7	75.0	70.2	55.2	48.3	37.5	51.9
1856 ...	23.6	26.7	33.4	54.5	62.7	77.2	80.1	72.2	66.2	53.4	43.1	30.1	53.5
1857 ...	20.9	39.9	38.2	45.4	61.2	71.2	77.3	75.3	69.2	56.2	45.9	41.0	54.5
1858 ...	40.8	30.1	40.7	52.5	59.3	77.5	79.2	75.0	67.9	59.5	42.2	37.6	55.2
1859 ...	34.0	36.4	49.1	50.3	64.6	70.8	76.0	74.5	66.2	52.3	47.5	33.0	54.5
1860 ...	33.0	33.1	44.5	49.1	63.5	71.1	76.2	74.9	65.4	56.5	46.1	32.2	53.8
1861 ...	31.0	39.4	42.4	52.5	58.8	72.5	75.0	72.6	67.6	59.0	43.8	36.6	54.3
1862 ...	32.0	31.9	39.2	49.1	62.6	68.2	75.1	76.2	68.7	57.8	43.9	35.4	53.3
1863 ...	37.0	33.9	36.2	48.3	74.1	69.1	76.8	79.0	65.4	55.0	46.8	34.8	53.9
1864 ...	32.7	35.2	39.4	49.3	66.5	71.4	77.4	79.1	66.7	54.0	44.9	35.8	54.4
1865 ...	26.6	32.4	40.7	55.6	62.9	76.6	77.9	75.6	73.8	55.6	45.0	37.5	55.5
1866 ...	30.1	35.4	41.0	55.3	61.2	73.3	80.2	72.2	69.3	56.4	47.3	34.3	54.7
1867 ...	26.3	40.1	37.5	52.9	57.2	71.0	75.8	74.6	67.6	56.4	46.8	31.8	53.2
1868 ...	30.2	26.6	40.8	47.0	58.0	71.7	81.4	77.5	67.8	53.2	45.7	32.5	52.7
1869 ...	36.6	39.4	38.9	52.8	60.1	72.8	75.8	75.1*	68.3	51.4	41.3	37.6	54.2
1870 ...	40.4	34.8	37.8	52.2	63.6	76.0	79.9	77.8	70.0	59.0	46.7	36.6	56.2
1871 ...	32.7	36.8	48.6	57.1	65.0	70.4	75.4	76.9	62.6	56.5	40.0	30.2	54.5
1872 ...	29.6	31.4	31.7	51.3	64.2	72.3	78.3	76.0	66.4	53.3	41.0	28.3	52.0
1873 ...	29.0	29.6	37.1	47.5	59.2	70.7	76.4	72.1	65.9	55.0	38.0	37.8	51.5
1874 ...	35.4	33.0	40.2	42.6	59.9	72.7	76.2	71.3	67.6	55.0	42.8	35.1	52.0
1875 ...	25.8	25.6	34.7	45.0	61.6	70.2	74.8	72.2	63.9	53.4	39.4	34.3	50.1
1876 ...	37.4	34.2	37.1	49.1	61.5	73.9	78.4	74.2	63.8	50.4	44.4	25.1	52.5
1877 ...	27.9	36.1	37.9	50.0	60.8	71.6	75.7	75.5	66.7	56.8	48.0	40.0	53.9
1878 ...	32.6	36.6	46.4	55.6	60.8	67.8	77.3	73.7	67.7	58.0	44.5	34.2	54.6
1879 ...	29.5	29.4	40.9	48.8	63.3	71.6	75.7	72.7	64.2	61.4	44.7	38.7	53.4
1880 ...	40.9	38.9	39.4	52.4	68.3	73.1	74.8	75.2	67.7	54.7	40.2	28.5	54.5
1881 ...	26.9	30.3	38.5	48.5	63.8	67.1	75.5	75.0	74.8	60.8	47.5	41.7	54.2
1882 ...	31.2	39.6	43.9	50.0	57.3	72.9	77.4	73.9	69.1	60.6	43.8	35.9	54.6
1883 ...	30.1	36.6	37.6	50.0	62.4	73.7	76.1	71.9	64.5	55.3	47.4	37.1	53.6
1884 ...	29.5	40.3	41.5	48.7	61.3	70.5	71.8	72.5	70.6	57.2	43.8	34.6	53.5
1885 ...	29.9	23.4	30.8	49.8	59.6	70.6	77.2	71.8	65.2	54.8	45.0	36.7	51.2
1886 ...	29.4	30.9	40.0	53.4	60.9	68.6	74.6	73.2	69.2	58.2	46.5	31.0	53.0
1887 ...	30.5	36.1	36.4	49.8	66.7	70.9	79.7	73.0	64.0	55.6	45.3	36.9	53.8
Mean..	32.0	33.4	40.7	51.9	62.8	72.4	76.9	74.7	67.3	55.9	44.3	34.7	53.9

* Interpolated.

Record of coldest days during one hundred years at Thompson, Conn., made by Mr. J. A. Wheelock, his father and grandfather, and by Mrs. Ellen D. Larned, who furnished the data to the Chief Signal Officer.

Year.	Month.	Day.	Temperature.	Year.	Month.	Day.	Temperature.
			°				°
1771	January	12	— 9	1831	January	6	—15
1772	January	19	—12	1832	January	16	—12
1773	January	4	— 8	1833	January	12	—10
1774	February	19	—10	1834	January	4	— 2
1775	January	19	—12	1835	January	26	— 6
1776	January	5	— 9	1836	February	4	— 2
1777	January	17	—10	1837	January	6	— 8
1778	January	15	—12	1838	January	19	—10
1779	January	4	— 8	1839	January	16	— 6
1780	February	12	— 9	1840	January	12	—12
1781	February	19	—12	1841	January	6	—10
1782	January	5	—10	1842	January	26	—12
1783	January	6	—15	1843	January	27	— 8
1784	January	19	—12	1844	February	4	—11
1785	March	4	—10	1845	February	6	— 2
1786	January	6	—12	1846	January	7	— 9
1787	January	9	— 9	1847	January	12	— 4
1788	February	6	—12	1848	February	6	—10
1789	February	9	—10	1849	February	4	— 3
1790	January	17	—16	1850	February	18	— 5
1791	January	6	—25	1851	January	17	— 9
1792	January	19	—15	1852	January	4	— 4
1793	January	6	—12	1853	January	27	— 6
1794	February	5	—14	1854	January	4	— 9
1795	January	9	—10	1855	January	17	—20
1796	January	19	—12	1856	January	21	—17
1797	January	5	—15	1857	January	4	—20
1798	January	19	—17	1858	February	4	—19
1799	February	5	—10	1859	January	7	—17
1800	February	4	—12	1860	February	14	—16
1801	January	9	—10	1861	February	4	—15
1802	January	19	— 9	1862	January	17	— 9
1803	January	6	— 6	1863	February	6	—10
1804	January	15	—10	1864	January	7	—17
1805	January	12	— 4	1865	January	4	—12
1806	February	5	— 2	1866	January	17	—19
1807	February	6	— 4	1867	January	27	—15
1808	January	19	—10	1868	January	7	— 9
1809	January	9	— 8	1869	January	13	— 5
1810	March	4	— 4	1870	March	3	— 2
1811	February	6	— 2	1871	February	5	—13
1812	January	16	— 6	1872	March	5	— 6
1813	January	6	— 9	1873	January	30	—11
1814	January	19	—10	1874	February	6	0
1815	January	5	—20	1875	December	20	— 8
1816	February	9	— 8	1876	February	24	— 5
1817	February	4	— 6	1877	January	5	2
1818	January	6	—10	1878	January	2	— 4
1819	January	19	—12	1879	January	21	— 4
1820	January	5	— 6	1880	December	31	— 6
1821	January	4	— 2	1881	January	1	— 5
1822	February	6	— 1		February	2	
1823	January	9	— 4	1882	January	24	—16
1824	January	16	—12	1883	December	23	—14
1825	January	12	— 8	1884	No record.		
1826	January	25	— 4	1885			
1827	January	26	— 8	1886	January	13	—11
1828	February	6	— 2	1887	January	19	—10
1829	February	4	— 4	1888	January	29	—11
1830	January	19	—10				

Monthly and annual mean temperatures, in degrees Fahr., at Cooperstown, Otsego Co., N. Y., from observations furnished by G. Pomeroy Keese.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1854	23.4	20.0	29.4	40.2	57.2	66.9	73.4	69.0	61.5	51.0	38.0	22.8	46.1
1855	25.2	14.9	27.4	39.8	52.6	60.3	68.8	64.0	58.5	44.9	36.8	26.2	43.3
1856	14.3	16.5	21.3	43.3	53.0	65.3	69.7	62.3	57.7	44.3	36.0	20.7	42.0
1857	10.3	31.7	28.0	36.3	50.7	59.7	66.7	63.7	57.0	44.3	33.7	29.7	42.8
1858	27.7	17.0	28.0	41.7	49.7	66.0	67.3	62.3	55.3	47.0	31.0	25.3	43.2
1859	21.7	25.7	34.7	38.3	57.0	60.0	65.0	64.0	54.0	44.3	37.7	19.0	43.5
1860	24.7	20.7	31.3	38.3	56.3	61.5	62.7	63.7	53.3	46.0	36.5	21.7	43.1
1861	18.7	26.0	27.3	40.3	46.7	61.3	64.7	61.0	55.3	47.3	32.0	24.5	42.1
1862	18.3	18.3	26.0	37.3	51.3	58.3	64.0	63.3	57.0	45.3	33.7	25.3	41.7
1863	25.3	20.0	20.7	38.3	53.7	57.3	67.0	65.0	53.3	43.3	35.7	21.7	41.7
1864	21.3	24.0	27.0	37.7	59.7	60.7	67.0	66.3	54.3	45.0	33.3	23.3	42.7
1865	14.3	17.0	32.3	43.0	52.3	66.3	63.0	61.3	60.7	40.7	34.0	27.0	42.7
1866	15.3	21.7	26.0	43.3	50.7	65.7	71.3	61.0	58.0	48.7	38.0	22.0	43.5
1867	13.3	29.3	27.3	42.7	50.0	66.7	66.7	66.7	59.3	48.3	36.7	18.7	43.8
1868	17.0	13.0	32.0	38.0	54.0	65.7	76.0	69.0	58.3	43.3	35.0	19.3	43.4
1869	24.7	24.0	24.0	42.3	54.0	65.0	68.7	66.0	63.0	43.3	33.0	27.0	44.6
1870	27.8	19.5	24.7	46.5	58.6	71.9	73.4	69.1	60.6	49.4	36.6	24.9	46.9
1871	19.8	22.0	37.2	45.5	55.6	63.8	67.2	68.7	53.9	49.8	29.8	21.5	44.6
1872	20.2	17.3	19.2	42.0	57.0	67.1	71.9	71.2	60.9	46.1	34.5	15.8	43.6
1873	17.3	18.7	25.6	39.5	57.0	66.1	70.0	66.6	58.8	47.2	26.8	28.6	43.5
1874	27.1	19.8	28.5	33.6	56.2	66.3	70.0	66.0	62.7	47.5	35.0	25.4	44.8
1875	12.3	10.7	24.0	36.6	55.5	65.0	68.5	66.3	57.3	45.5	29.5	26.5	41.5
1876	28.0	22.8	26.5	39.5	55.0	70.0	72.5	71.0	58.2	44.1	38.5	14.7	45.1
1877	17.4	26.5	28.5	44.0	56.5	67.6	70.6	71.5	62.5	51.3	38.5	31.8	45.6
1878	21.3	24.3	36.0	51.6	53.3	62.4	70.0	67.2	59.8	49.0	35.7	24.5	46.3
1879	18.3	17.8	29.0	38.0	57.0	63.5	69.3	65.5	56.6	53.3	34.7	29.0	44.3
1880	31.6	27.3	28.0	43.3	60.7	64.5	68.3	63.7	58.7	45.0	29.7	18.3	44.9
1881	14.0	19.0	30.0	38.1	59.7	59.0	68.0	67.0	66.7	49.6	36.3	33.1	45.0
1882	20.7	26.3	31.3	39.0	49.7	62.3	68.3	68.7	60.3	50.0	33.1	24.4	44.5
1883	16.6	22.0	21.8	39.6	54.3	66.7	68.0	64.3	56.3	45.0	37.3	25.5	43.1
1884	17.3	27.5	28.3	40.7	51.3	65.7	64.5	66.5	61.6	48.3	36.1	27.5	44.6
1885	19.0	10.5	18.3	40.3	53.5	62.5	68.3	63.5	56.3	46.3	37.7	27.5	42.0
1886	18.3	20.0	29.0	46.1	54.0	60.8	65.6	63.7	59.0	48.0	35.5	21.0	43.4
1887	18.0	22.5	24.0	38.5	60.7	65.5	73.0	64.0	54.7	44.7	34.5	25.7	43.8
Mean..	20.0	21.0	27.4	40.7	54.5	64.0	68.6	65.7	55.3	46.7	34.7	27.1	43.8

Rainfall in inches and hundredths at Cooperstown, Otsego Co., N. Y., from observations furnished by G. Pomeroy Keese.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1854	2.10	3.46	3.33	7.12	3.11	2.85	2.35	1.43	4.13	3.11	2.71	2.30	37.90
1855	3.34	1.23	0.61	4.15	2.20	9.76	4.84	6.78	2.24	5.28	3.56	4.13	48.12
1856	1.12	0.60	1.54	3.42	4.44	2.19	2.82	9.46	3.45	0.88	2.00	2.65	34.57
1857	2.36	2.15	1.83	5.53	5.63	7.80	5.20	6.79	2.45	6.65	2.29	3.32	52.00
1858	1.77	1.66	0.97	2.66	4.65	8.08	7.11	3.43	2.43	4.46	5.38	2.82	45.42
1859	2.53	0.94	3.95	4.19	1.92	5.39	4.47	4.65	5.41	1.66	3.18	3.02	41.31
1860	0.32	0.71	1.05	1.55	1.83	3.15	6.89	7.07	2.69	2.80	4.22	1.45	33.73
1861	2.00	1.30	2.71	3.92	3.14	1.97	7.36	4.64	3.57	5.16	3.13	1.78	40.68
1862	3.66	1.73	3.80	1.90	1.40	6.13	3.37	3.28	2.39	4.80	4.17	1.34	37.97
1863	4.04	2.32	2.92	0.92	6.28	3.43	7.92	5.86	4.33	1.74	3.59	3.94	47.39
1864	1.68	0.85	2.29	2.19	3.40	1.00	1.79	5.81	2.86	2.39	2.37	3.27	29.90
1865	2.23	1.60	3.45	2.19	4.92	2.39	3.70	1.02	4.86	3.80	3.34	1.94	35.44
1866	0.97	3.45	1.70	1.02	2.00	4.27	3.57	2.24	5.04	1.32	4.25	2.50	32.33
1867	0.85	3.45	1.70	3.54	7.38	2.15	3.35	5.40	3.36	3.68	1.52	1.63	38.01
1868	2.24	0.93	2.74	2.43	5.76	4.94	0.89	2.47	5.74	2.10	5.28	1.91	37.43
1869	4.31	2.67	2.88	3.68	5.49	4.31	4.57	3.02	3.31	6.10	1.91	3.69	45.94
1870	4.17	3.72	2.53	2.36	1.94	0.95	4.14	2.74	2.76	3.80	1.92	1.96	32.99
1871	1.14	1.94	5.29	2.66	3.18	5.24	4.64	4.50	1.17	1.97	2.68	1.76	36.17
1872	0.52	1.58	0.80	1.17	4.16	7.31	5.84	4.45	3.32	3.62	1.98	2.17	36.92
1873	3.01	1.67	4.00	3.09	1.65	1.94	5.26	5.52	3.41	5.62	4.16	2.86	42.19
1874	3.70	3.30	1.35	4.10	1.68	7.00	5.34	1.06	2.25	3.60	2.85	1.27	36.50
1875	2.16	1.19	3.19	2.55	2.36	5.24	3.24	5.85	2.52	4.96	3.00	1.48	37.74
1876	2.11	4.13	3.36	1.68	1.97	4.93	5.13	0.63	5.79	1.73	1.45	2.26	35.17
1877	2.58	0.63	3.37	1.77	1.27	4.71	6.78	2.84	1.92	4.42	3.22	0.97	34.46
1878	3.33	1.80	2.87	2.47	4.20	4.25	3.57	2.93	3.29	3.29	3.18	3.80	38.98
1879	2.35	2.91	2.01	3.48	0.36	4.16	2.85	1.43	2.12	1.26	3.00	4.26	30.19
1880	4.26	2.26	1.71	2.76	3.32	2.78	4.49	2.78	3.17	2.43	3.02	1.23	34.20
1881	2.54	1.53	3.05	0.98	3.00	3.59	3.07	0.72	1.43	4.89	3.24	6.02	34.06
1882	2.67	3.17	2.48	1.30	3.98	4.88	2.44	0.91	3.68	1.48	1.79	2.02	30.80
1883	1.49	3.74	1.69	1.68	3.15	4.62	4.77	3.21	5.05	2.96	1.76	1.93	36.03
1884	3.17	3.16	4.48	1.30	3.97	2.16	3.01	2.46	1.29	3.31	2.86	4.00	35.07
1885	3.00	2.46	0.55	1.94	3.39	3.59	3.00	9.08	1.96	4.19	3.05	2.15	38.36
1886	1.83	1.86	2.92	1.86	2.50	3.01	3.02	2.56	4.12	2.54	4.72	2.00	32.94
1887	3.23	5.21	4.32	2.42	2.83	2.56	2.85	3.34	1.42	1.19	3.15	3.43	35.95
Mean..	2.43	2.21	2.57	2.64	3.31	4.20	4.22	3.83	3.20	3.30	3.06	2.57	37.55

Monthly and annual mean temperatures (in degrees Fahr.) at New Ulm, Austin Co., Tex., from observations of Mr. C. Runge.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1872	.....	.....	.....	.....	.....	.....	84.3	83.4	81.1	70.4	54.4	47.1	.....
1873	47.3	58.1	63.4	65.7	73.7	79.1	80.7	84.4	77.2	65.8	59.7	56.2	67.6
1874	54.4	55.6	65.2	63.6	74.2	80.1	82.3	82.5	76.3	70.1	63.3	57.4	68.8
1875	34.8	56.6	61.4	65.2	74.9	80.6	82.8	82.4	75.7	68.8	62.2	60.9	67.9
1876	59.6	59.1	59.6	69.1	74.4	79.8	83.2	83.8	75.6	70.1	56.6	46.1	68.1
1877	48.2	55.3	62.7	67.7	73*	72.2	81.2	82.8	79.4	79.6	56.0	55.4	67.0
1878	50.6	55.6	67.8	71.4	75.9	81.6	83.1	80.9	77.5	71.6	61.1	48.2	68.8
1879	52.5	55.0	78.4	70.3	77.4	81.4	85.0	79.4	72.4	70.9	65.6	58.3	69.7
1880	63.7	56.4	60.5	71.4	75.7	79.9	80.6	82.4	76.1	66.0	49.6	51.3	67.8
1881	43.2	53.3	62.4	69.0	76.2	85.0	84.1	82.8	79.2	73.9	58.6	57.2	68.7
1882	55.8	62.0	66.4	71.2	73.4	80.3	82.0	79.4	76.8	73.3	60.5	54.2	69.6
1883	47.2	52.6	62.4	69.8	73.6	80.7	82.0	83.5	76.4	72.9	61.6	55.2	68.2
1884	44.0	56.5	63.4	65.0	72.2	79.0	84.2	82.6	80.0	69.9	57.9	53.6*	67.4
1885	50.0*	56.3*	58.0	69.3	72.0	81.2	81.5	83.6	77.8	66.4	61.2	54.4	67.6
1886	43.6	54.2	58.7	66.6	76.1	81.7	83.4	84.0	77.8	69.1	58.7	52.7	67.2
1887	49.6	59.2	64.2	68.9	75.1	79.2	83.3	83.4	78.3	67.0	59.8	48.8	68.1
1888	46.5	55.5	57.3	70.9	72.6	78.4	.....	.....	.....	.....	.....	.....	.....
Mean..	50.0	56.3	62.6	68.4	74.4	80.0	82.7	83.2	76.7	69.7	59.2	53.6	68.1

*Interpolated.

Precipitation (in inches and hundredths) at New Ulm, Austin Co., Tex., from observations of Mr. C. Runge.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1872	.....	.....	.....	.....	.....	.....	0.90	2.35	0.90	4.30	4.25	6.63	19.33
1873	6.00	2.15	4.80	8.00	1.88	11.33	14.38	4.48	8.95	5.10	14.93	3.08	85.08
1874	2.23	6.94	8.45	4.30	2.90	3.76	6.46	1.96	15.06	0.79	5.81	8.96	67.64
1875	3.68	7.00	2.56	5.06	4.23	1.89	2.13	0.90	12.49	3.54	3.50	16.43	63.41
1876	3.43	2.46	7.15	1.08	6.13	3.23	8.13	2.60	3.53	1.73	1.13	2.63	43.23
1877	1.13	6.75	4.25	5.94	4.50	9.00	2.10	0.55	2.38	11.31	6.04	5.35	59.30
1878	5.88	3.56	2.35	1.88	3.56	4.38	5.44	8.38	5.06	1.19	6.96	5.00	52.64
1879	4.38	1.13	3.96	6.44	3.19	3.06	2.00	4.19	3.44	4.00	0.78	2.59	39.16
1880	6.44	7.15	9.13	4.13	6.22	4.59	8.75	4.06	4.25	3.50	8.63	0.44	67.29
1881	1.75	8.31	2.44	2.75	4.63	0.63	5.69	5.63	3.41	12.44	8.75	3.56	59.99
1882	10.56	10.94	4.81	2.94	12.25	0.81	2.44	4.63	3.88	5.95	7.63	2.25	79.09
1883	7.72	4.31	13.13	2.54	3.07	3.38	1.22	2.19	7.71	3.51	5.32	2.61	56.71
1884	3.43	2.58	4.86	4.68	15.25	2.82	0.00	0.21	5.18	1.78	5.05	3.62*	49.46
1885	4.04*	1.06	2.14	5.71	8.01	0.51	3.24	0.09	3.51	1.93	0.89	3.79	34.92
1886	1.13	1.65	4.75	2.01	0.05	0.68	2.10	4.64	7.81	0.92	1.50	0.97	28.21
1887	1.09	2.00	1.27	0.17	3.56	2.24	2.76	1.72	3.26	2.70	0.48	4.97	26.22
1888	2.75	4.66	2.72	3.76	7.74	10.42	.....	.....	.....	.....	.....	.....	32.05
Mean..	4.04	4.54	4.92	3.84	5.45	3.92	4.23	3.04	5.68	4.04	5.10	3.62	42.00

*Interpolated.

Table of miscellaneous meteorological data for May, 1888—Signal Service observations.

Stations and districts.	Elevation above sea-level, feet.	Atmospheric pressure, in inches and hundredths.								Temperature of the air, in degrees Fahrenheit.														Mean relative humidity, per cent.	Mean temperature of dew-point, degrees Fahrenheit.	Precipitation, in inches.		Winds.						
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.				Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.				Monthly range.	Daily ranges.											Departure from normal precipitation, in inches.	Total movement, miles.	Prevailing direction.	Maximum velocity.		Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
					Highest barometer.	Date.	Lowest barometer.	Date.				Max.	Date.	Mean max.	Min.	Date.	Mean min.		Greatest.	Date.	Least.	Date.								Miles p. h.	Direction.					
New England.										61.3	— 3.0															4.33	+ 1.30							
Eastport	53	29.94	+ .04	30.00	30.22	11	29.72	1	0.50	45.3	— 1.7	65.8	26	52.1	30.0	2	36.2	35.8	25.5	9	2.0	14	75.2	36.8	2.74	— 1.60	6,841	e.	36	e.	1	13	7	14	10
Portland	99	29.90	+ .04	30.00	30.27	4	29.75	1	0.52	48.8	— 6.2	66.6	31	55.0	32.3	3	43.2	34.3	22.9	3	2.8	28	84.3	44.0	3.36	+ 0.22	4,758	e.	25	e.	12	12	12	15	4
Manchester	247	29.75	.....	30.01	30.30	4	29.74	31	0.56	53.5	— 2.5	81.0	29	62.1	26.5	3	43.4	52.5	34.7	22	4.3	19	62.1	43.4	4.05	.....	3,950	nw.	24	nw.	7	16	7	9	5
Northfield	871	29.05	.....	29.99	30.31	8	29.72	31	0.59	56.6	.....	77.2	23	62.2	24.5	3	40.9	52.7	39.5	22	4.5	2	79.2	44.6	3.51	.....	6,424	s.	30	s.	14	15	16	13	2
Boston	125	29.88	+ .03	30.02	30.32	8	29.77	31	0.55	52.5	— 3.5	77.0	10	60.7	35.0	3	45.5	42.0	26.6	6	4.8	4	74.3	43.4	5.20	+ 1.81	6,884	e.	28	e.	12	22	16	11	4
Edgartown*	.....	.....	.....	.....	.....	.....	.....	.....	.....	51.5	.....	76.0	29	56.9	36.9	3	46.1	39.1	24.0	29	4.1	25	.....	.....	4.74	.....	.....	sw.	.....	.....	.....	16	.....	.....	.....
Nantucket	14	30.00	.....	30.01	30.32	8	29.72	1	0.60	50.5	— 3.5	69.8	29	56.1	37.0	3	45.3	32.8	22.8	29	3.0	26	87.9	46.7	7.87	.....	8,058	sw.	36	e.	25	20	10	17	4
Wood's Holl	22	29.99	.....	30.01	30.32	8	29.72	1	0.60	50.7	— 4.3	69.4	29	56.2	37.0	3	45.8	32.4	17.9	7	3.5	19	84.6	46.6	5.59	+ 2.90	8,926	sw.	36	sw.	20	20	11	12	8
Vineyard Haven	.....	.....	.....	.....	.....	.....	.....	.....	.....	54.5	.....	74.0	30	61.8	26.0	2	47.2	48.0	25.3	6	5.0	26	.....	.....	4.25	.....	.....	se.	.....	.....	.....	18	.....	.....	.....
Block Island	26	29.98	— .01	30.01	30.32	8	29.71	1	0.61	49.9	— 3.1	71.0	29	54.5	34.9	3	44.5	36.0	21.1	29	3.6	24	88.3	46.1	3.54	— 0.62	9,940	ne.	36	e.	25	16	18	9	4
Narragansett Pier	.....	.....	.....	.....	.....	.....	.....	.....	.....	53.6	.....	78.0	29	61.8	32.0	3	45.5	46.0	28.0	29	5.0	28	.....	.....	7.29	+ 4.25	.....	sw.	.....	.....	.....	20	.....	.....	.....
New Haven	107	29.89	+ .01	30.01	30.31	8	29.73	1	0.58	55.0	— 2.0	79.9	29	62.8	32.4	3	48.4	47.5	25.4	29	5.3	28	80.7	48.6	6.03	+ 2.72	5,094	ne.	27	e.	12	21	14	13	4
New London	47	29.94	— .02	29.99	30.30	8	29.71	1	0.59	55.4	— 0.6	76.8	29	62.0	35.8	3	49.1	41.0	23.8	29	6.7	11	80.6	50.0	4.90	+ 1.48	4,944	s.	34	se.	12	18	10	16	5
Mid. Atlantic States.										60.7	+ 2.2															5.19	+ 2.03							
Albany	85	29.90	+ .01	29.99	30.33	8	29.70	12	0.63	57.7	— 3.3	79.3	30	66.7	32.8	3	48.4	46.5	28.5	22	7.4	28	69.9	46.9	2.98	+ 0.11	4,434	nw.	30	se.	4	17	13	14	4
New York City	185	29.81	.00	30.01	30.32	8	29.72	31	0.60	57.9	— 1.1	82.1	29	66.9	40.7	17	51.7	41.4	25.8	29	6.8	16	75.0	49.4	4.87	— 1.94	5,980	s.	34	nw.	29	21	16	14	1
Philadelphia	117	29.89	.00	30.01	30.30	8	29.71	12	0.59	60.6	— 1.4	86.6	29	69.0	42.5	17	53.5	44.1	28.8	29	6.0	31	70.4	50.0	3.46	+ 0.61	6,530	nw.	36	w.	30	19	18	11	2
Atlantic City	34	29.97	— .01	30.00	30.29	3	29.71	31	0.58	55.1	— 1.9	74.2	30	62.4	40.2	17	50.4	34.0	22.5	15	4.4	24	84.6	50.3	4.02	+ 1.56	6,436	s.	24	sw.	16	13	7	21	3
Baltimore	45	29.95	— .02	29.99	30.28	21	29.68	12	0.60	62.6	— 2.4	86.5	29	69.9	40.8	3	55.7	45.7	23.5	6	5.7	18	67.3	50.4	4.22	+ 1.05	4,041	se.	20	s.	4	17	16	12	3
Washington City	106	29.88	— .03	30.00	30.29	3	29.69	12	0.60	62.7	— 2.3	89.0	29	71.4	38.6	3	54.5	50.4	29.4	6	4.6	24	74.5	53.5	4.77	+ 1.37	40,40	nw.	27	sw.	4	17	17	10	4
Cape Henry	.....	.....	.....	.....	.....	.....	.....	.....	.....	65.3	.....	92.4	28	74.1	43.0	3	56.5	49.4	32.9	28	4.0	22	.....	.....	8.17	+ 4.50	.....	ne.	.....	.....	.....	16	.....	.....	.....
Lynchburg	652	29.28	— .05	29.96	30.29	6	29.73	12	0.56	64.0	— 3.0	89.5	28	73.7	41.2	3	55.6	48.3	29.8	6	8.0	25	69.3	53.1	5.75	+ 2.43	3,264	ne.	24	sw.	1	19	17	11	3
Norfolk	69	29.92	— .07	29.99	30.28	3	29.74	31	0.54	64.9	— 2.1	90.0	28	74.5	44.1	3	57.5	45.9	28.5	28	6.6	22	81.9	58.6	8.46	+ 4.72	6,705	s.	30	w.	12	17	9	15	7
S. Atlantic States.										70.2	— 0.8															5.12	+ 1.54							
Charlotte	808	29.15	— .03	29.99	30.29	6	29.77	31	0.52	67.3	— 1.7	94.0	28	79.3	40.0	15	58.3	54.0	30.5	18	6.7	10	72.8	56.7	5.64	+ 1.42	4,173	sw.	30	nw.	28	19	14	15	2
Hatteras	11	30.02	.00	30.04	30.32	7	29.84	24	0.48	66.7	— 0.3	76.6	30	72.2	48.8	3	61.4	27.8	18.7	4	4.2	11	89.3	63.6	7.27	+ 3.33	9,145	s.	35	e.	22	10	9	16	6
Kitty Hawk	.....	.....	.....	.....	.....	.....	.....	.....	.....	68.6	.....	93.3	28	79.3	46.0	22	57.9	52.3	37.9	28	7.6	26	.....	.....	5.80	+ 2.26	.....	sw.	.....	.....	.....	19	.....	.....	.....
Raleigh	375	29.60	.....	29.99	30.28	3	29.74	1	0.54	66.6	— 1.4	89.8	29	76.2	44.0	15	58.0	45.8	30.0	18	6.1	21	74.2	57.2	6.07	.....	3,866	sw.	24	ne.	22	19	12	15	4
Southport	.....	.....	.....	.....	.....	.....	.....	.....	.....	73.9	.....	84.0	29	83.4	51.0	15	65.4	33.0	21.0	15	3.5	21	.....	.....	3.40	+ 0.38	.....	sw.	.....	.....	.....	6	.....	.....	.....
Wilmington	52	29.94	— .03	30.00	30.28	7	29.78	23	0.50	69.9	— 0.1	85.5	26	77.2	50.7	14	63.0	34.8	26.3	14	5.6	21	83.2	64.4	4.41	+ 0.11	5,852	sw.	24	e.	21	9	9	16	6
Charleston	52	29.94	— .04	29.99	30.26	7	29.80	11	0.46	72.3	— 0.7	87.0	26	79.4	51.8	15	67.0	35.2	19.2	15	6.0	31	80.9	65.6	5.82	+ 1.62	7,335	sw.	30	se.	21	12	8	18	5
Columbia	.....	.....	.....	.....	.....	.....	.....	.....	.....	71.2	.....	93.5	28	80.6	45.0	15	62.0	48.5	28.8	27	4.8	10	74.5	61.8	2.80	.....	.....	.....	.....	.....	.....	13	7	18	6
Augusta	183	29.80	— .04	29.99	30.26	7	29.77	10	0.49	71.9	— 0.1	93.8	29	83.5	46.0	15	61.9	47.2	33.2	16	5.6	10	72.8	61.4	4.59	+ 1.20	3,164	se.	25	ne.	21	10	13	11	7
Savannah	87	29.89	— .05	29.98	30.24	7	29.71	10	0.53	72.5	— 1.5	90.6	17	82.1	52.5	15	65.7	38.1	29.3	16	7.5	29	76.3	63.7	3.60	+ 0.57	5,659	s.	24	e.	3	9	7	14	6
Jacksonville	43	29.93	— .05	29.98	30.21	7	29.71	10	0.50	74.2	— 0.8	93.0	29	84.8	56.5	16	66.3	36.5	32.5	16	10.3	9	73.6	64.4	5.46	+ 1.17	4,682	se.	29	w.	25	15	3	17	11
Florida Peninsula.										78.9	— 0.6															2.18	— 1.00							
Titusville	12	30.00	.....	30.01	30.21	7	29.74	10	0.47	75.3	.....	88.0	24	81.6	62.0	1	67.1	26.0	25.2	24	5.0	6	81.7	69.0	2.92	.....	8,195	se.	32	e.	9	8	2	16	13
Cedar Keys	22	29.97	— .03	29.99	30.18	4	29.75	10	0.43	75.3	+ 0.3	86.5	29	81.0	62.8	3	70.3	23.7	16.9	14	3.0	25	75.0	66.4	1.70	— 0.98	6,632	w.	37	w.	20	12	4	16	11
Key West	22	29.97	— .02	29.99	30.11	7	29.78	10	0.33	78.5	— 1.5	85.4	29	82.1	66.0	13	73.6	19.4	13.3	23	5.4	12	78.1	70.9	0.05	— 1.01	6,501	se.	36	nw.	21	7	6	20	5
Jupiter	28	29.96	.....	29.99	30.17	7	29.76	10	0.41	76.3	.....	88.4	23	82.0	62.4	2	70.1	26.0	19.6	2	6.4	9	84.7	71.1	8.86	.....	7,272	se.	25	n.	20	12	6	10	15
Sebastian	.....	.....	.....	.....	.....	.....	.....	.....	.....	77.3	.....	92.6	31	86.9	63.1	25	67.7	29.5	24.1	26	10.5	8	.....	.....	5.59	.....	.....	s.	.....	.....	.....	14	.....	.....	.....
Eastern Gulf States.										71.1	— 1.3															6.24	+ 1.94							
Atlanta	1,129	28.81	— .06	29.98	30.22	7	29.78	31	0.44	68.1	— 0.9	88.0	27	77.6	44.3	2	59.5	43.7	35.2	2	5.3	21	69.2	56.4	6.86	+ 3.48	6,391	sw.	31	e.	20	15	11	12	8
Pensacola	56	29.91	— .08	29.97	30.15	15	29.77	10	0.38	73.3	— 0.7	85.0	30	78.3	57.5	2	67.0	27.5	17.6	14	1.5	5	76.0	64.9	4.81	+ 1.20	5,859	sw.	30	se.	6	11	4	16	11
Mobile	35	29.93	— .05	29.97	30.16	15	29.75	10	0.41	72.1	— 1.9	85.2	10	80.2	54.0	2	64.1	31.2	29.0	14	9.0	6	79.7	64.8	7.30	+ 2.77	6,011	s.	30	sw.	25	9	5	15	11
Montgomery	217	29.73	— .06	29.96	30.19	15	29.77	10	0.42	72.4	— 0.6	92.4	27	82.3	48.5	15	62.8	43.9	33.8	3	5.5	20	64.7	58.1	5.19	+ 1.24	3,306	sw.	23	ne.	19	15	9	11	11
Vicksburg	222	29.70	— .07	29.92	30.13	13	29.69	10	0.44	71.7	— 1.3	89.0	26	82.0	50.0	1	62.6	39.0	29.0	15	9.4	29	70.9	60.6	3.55	— 1.50	4,734	s.	39	nw.	24	11	6	17	8
University	.....	.....	.....	.....	.....	.....	.....	.....	.....	70.2	.....	87.9	27	80.4	45.9	1	59.9	42.0	30.6	2	11.1	30	.....	.....	3.09	.....	.....	se.	.....	.....	.....	13	.....	.....	.....
New Orleans	52	29.89	— .05	29.95	30.12	15	29.73	24	0.39	72.8	— 2.2	88.5	27	83.2	60.0	1	65.9	28.5	22.0	26	12.5	1	76.8	64.4	9.75	+ 4.45	5,179	se.	48	nw.	24	12	5	11	15
Auburn	.....	.....	.....	.....	.....	.....	.....	.....	.....	70.1	.....	87.0	27	78.3	48.0	15	62.0	39.0	28.0	2	5.0	21	.....	.....	6.54	.....	.....	sw.	.....	.....	.....	12	.....	.....	.....
Western Gulf States.										72.0	— 1.2															5.02	+ 0.18							
Shreveport	249	29.65	— .09	29.90	30.08	14	29.63	27	0.45	72.7	— 1.3	89.5	26	81.8	51.8	1	62.6	37.8	27.0	15	8.8	30	71.5	62.1	3.44	— 1.36	4,872	s.	48	nw.	24	12	11	10	10
Fort Smith	470	29.41	— .04	29.91	30.21	14	29.68	27	0.53	67.7	— 1.3	88.0	26	79.2	44.0	1	57.7	44.0	31.5	1	8.0	28	70.6	56.8	5.49	+ 1.72	3,810	se.	21	sw.	15	9	5	14	12
Little Rock	309	29.60	— .05	29.92	30.20	14	29.70	28	0.50	69.1	— 0.9	88.5	23	79.5	45.0	1	58.0	43.5	32.2	15	12.5	27	68.9	57.4	5.09	— 0.64	4,279	sw.	35	nw.	24	9	8	14	9
Corpus Christi	20	29.87	— .08	29.89	30.09	14	29.64	28	0.45	76.6	— 0.6	86.4	23	80.7	44.5	19	69.5	41.9	34.3	19	3.6	21	83.4	71.0	8.72	.....	10,684	se.	80	ne.	28	10	6	17	8
Galveston	44	29.88	— .06	29.92	30.08	14	29.72	11	0.36	74.8	— 1.2	86.4	24	79.7	61.8	1	70.1	24.6	22.3	7	2.0	4	77.8	67.0	5.18	+ 0.85	8,751	s.	48	ne.	28	9	7	15	9
Palestine	533	29.36	— .08	29.91	30.08	14	29.70	27	0.38	70.4	— 1.6	88.3	26	80.0	48.6	1	61.9	39.7	26.9	1	9.4	30	77.1	61.8	6.64	— 0.16	6,472	s.	48	nw.	18	12	8	14	9
San Antonio	781	29.10	— .03	29.91	30.15	14	29.66	27	0.49	72.8	— 1.2	90.7	24	82.9	54.5	1	64.8	36.2	26.8	31	12.0	18	77.4	64.8	4.25	+ 0.66	6,377	se.	34	ne.	28	13	12	17	2
Rio Grande Valley.										78.3	— 0.7															1.54	— 2.06							
Rio Grande City	230	29.68	— .05	29.92	30.14	13	29.66	28	0.48	78.6	— 1.4	100.3	24	89.1	62.8	1	71.3	37.5	25.0	31	7.5	29	79.0	70.7	1.31	— 2.14	5,626	s.	24	n.	28	5	3	19	9
Brownsville	57	29.83	— .05	29.89	30.08	1	29.63	28	0.45	78.0	0.0	88.3	25	84.8	63.9	1	72.0	24.4	17.5	31	9.3	29	85.0	72.9	1.77	— 1.97	6,821	s.	34	s.	28	6	3	19	9
Ohio Val. & Tenn.										64.2	— 2.4															3.82	+ 0.04							
Chattanooga	783	29.15	— .06	29.97	30.21	6	29.75	11	0.46	66.9	— 1.1	87.8	27	76.6	39.8	15	58.0	48.0	31.4	3	5.6	20	78.5	59.0	4.91	+ 0.62	4,119	nw.	23	e.	10	16	8	18	5
Knoxville	980	28.95	— .06	29.98	30.22	6	29.79	11	0.43	65.2	— 1.8	86.6	27	75.4	30.1	15	56.6	50.5	31.7	15	7.0	1	77.8	57.5	6.30	+ 3.63	4,373	sw.	26	w.	18	16	13	12	6
Memphis	330	29.00	— .05	29.94	30.14	14	29.71	24	0.43	69.2	— 1.8	88.4	27	78.1	46.0	1	60.0	42.4	30.0	2	6.0	29	64.7	55.6	2.35	— 2.13	4,752	sw.	30	nw.	31	11	11	12	8
Nashville	549	29.36	— .06	29.93	30.15	5	29.71	24	0.44	66.0	— 3.0	88.4	27	76.4	37.0	2	56.5	51.4	33.5	6	8.6	1	65.8	52.7	2.97	— 0.57	4,687	w.	27	nw.	12	16	9	18	4
Louisville	551	29.30	— .05	29.94	30.24	6	29.68	28	0.56	65.2	— 1.8	90.8	27	74.6	37.5	15	54.5	53.3	30.5	3	8.3	29	60.7	49.9	2.42	— 1.42	5,921	sw.	30	sw.	18	11	12	14	5
Indianapolis	706	29.13	— .05	29.94	30.29	20	29.61	28	0.68	60.5	— 3.5	86.2	27	70.9	36.0	15	50.6	50.2	33.4	3	8.8	25	62.3	46.1	4.73	+ 0.61	3,431	e.	18	sw.	3	11	10	15	6
Terre Haute	.....	.....	.....	.....	.....	.....	.....	.....	.....	62.2	.....	88.6	11	73.4	34.9	15	51.0	53.7	30.0	5	12.7	25	.....	.....	4.44	.....	.....	e.	.....	.....	.....	12	.....	.....	.....
Cincinnati	628	29.28	— .05	29.95	30.28	20	29.64	28	0.64	62.9	— 3.1	87.6	27	72.8	38.8	15	53.5	48.8	33.2	3	10.3	25	61.1	47.8	2.70	— 0.68	5,240	se.	30	s.	28	13	11	15	5
Columbus	812	29.10	— .04	29.96	30.33	20	29.62	26	0.71	60.4	— 2.6	82.0	11	69.9	38.3	14	51.2	43.7	35.4	5	10.5	14	62.0	46.0	3.89	— 0.85	5,688	w.	39	sw.	4	12	9	15	7
Pittsburg	847	29.06	— .04	29.94	30.31	20	29.64	12	0.67	61.4	— 2.6	85.2	28	71.2	37.2	17	52.5	48.0	31.7	3	9.8	23	67.7	49.8	4.13	+ 1.13	5,034	nw.	32	w.	12	18	10	19	2
Lexington	.....	28.91	.....	.....	.....	.....	.....	.....	.....	62.9	.....	88.0	27	73.0	33.8	15	52.7	54.2	32.0	5	7.6	16	63.4	48.9	3.29	.....	5,298	sw.	30	s.	4	13	12	15	4
Lower lake region.										54.4	— 3.1															2.25	— 0.99							
Buffalo	690	29.23	— .01	29.98	30.39	7	29.57	28	0.82	53.2	— 0.8	80.7	11	61.8	33.4	2	45.7	47.3	31.2	12	5.7	14	71.5	43.4	1.66	— 1.48	6,496	sw.	42	s.	29	19	6	20	5
Oswego	335	29.61	— .01	29.98	30.34	7	29.60	28	0.74	52.0	— 3.0	77.0	11	60.0	32.5	3	44.6	44.5	31.0	23	3.9	1	74.5	43.6	1.56	— 1.10	6,988	se.	26	se.	4	18	13	16	2
Rochester	621	29.31	— .01	29.98	30.36	7	29.59	28	0.77	54.1	— 2.9	77.6	11	62.4	33.0	3	46.9	44.6	29.2	4	5.5	16	66.7	42.2	1.79	— 1.23	7,437	se.	43	sw.	29	15	9	17	5
Erie	681	29.23	— .03	29.97	30.38	7	29.59	12	0.79	54.5	— 3.5	81.0	4	62.9	36.0	2	47.7	45.0	30.0	4	6.0	19	67.4	43.2	2.26	— 1.20	6,602	s.	30	w.	4	14	8	20	3
Cleveland	690	29.22	— .04	29.96	30.40	7	29.59	12	0.81	56.2	— 1.8	79.8	11	65.3	34.2	20	48.5	45.6	33.5	3	4.5	14	69.0	45.4	2.84	— 0.33	6,262	s.	36	sw.	4	13	9	17	5
Sandusky	629	29.30	— .02	29.98	30.36	20	29.60	28	0.76	55.6	— 3.4	84.0	11	63.9	36.9	2	48.4	47.1	30.4	8	6.0	14	68.3	44.7	2.30	— 1.04	7,224	e.	36	nw.	28	10	8	18	5
Toledo	673	29.24	— .05	29.97	30.36	20	29.57	28	0.79	55.1	— 4.9	81.0	11	63.9	30.8	2	47.0	50.2	27.0	10	5.5	14	66.5	43.3	3.26	— 0.03	7,546	w.	40	ne.	28	9	10	19	2
Detroit	669	29.24	— .04	29.96	30.38	7	29.52	28	0.86	54.2	— 4.8	79.0	11	62.7	30.0	2	46.0	49.0	26.0	6	6.7	18	63.7	40.9	1.94	— 1.52	7,453	w.	40	w.	28	12	10	19	2
Upper lake region.										48.2	— 5.1															3.47	+ 0.16							
Alpena	609	29.29	— .02	29.96	30.44	7	29.40	12	1.04	44.5	— 5.5	71.8	29	51.2	27.3	2	38.2	44.5	30.3	29	2.7	3	78.8	37.8	3.03	— 0.56	6,163	se.	42	e.	4	17	15	13	3
Escanaba	608	.....	.....	.....	.....	.....	.....	.....	.....	45.8	.....	73.0	29	54.7	20.5	2	30.8	52.5	32.0	5	3.5	9	.....	.....	3.53	— 0.03	.....	se.	.....	.....	.....	16	.....	.....	.....
Grand Haven	620	29.25	— .05	29.92	30.33	20	29.52	11	0.81	50.1	— 5.9	77.6	23	58.5	30.0	1	42.1	47.6	26.3	20	4.9	14	71.7	40.3	3.01	— 0.29	7,526	w.	30	sw.	4	15	14	10	7
Lansing	883	29.00	.....	29.94	30.33	7	29.49	28	0.84	53.1	— 4.9	82.0	12	63.8	29.0	2	43.0	53.0	35.5	20	6.8	14	76.7	44.9	3.95	.....	5,647	se.	29	sw.	4	16	12	13	6
Marquette	672	29.20	— .05	29.94	30.48	7	29.43	12	1.05	43.2	— 6.8	75.7	24	50.7	21.8	2	36.1	53.9	38.0	23	4.9	14	73.2	35.0	3.27	+ 1.00	4,822	nw.	30	nw.	29	15	16	10	5
Port Huron	639	29.28	— .01	29.96	30.41	7	29.54	28	0.87	51.2	— 1.8	79.8	11	60.6	28.5	2	42 7	51.3	36.7	9	4.0	1	72.4	41.9	2.40	— 0.78	7,688	n.	41	w.	4	16	14	10

Table of miscellaneous meteorological data for May. 1888—*Signal Service observations*—Continued.

Stations and districts.	Elevation above sea-level, feet.	Atmospheric pressure, in inches and hundredths.								Temperature of the air, in degrees Fahrenheit.												Mean relative humidity, per cent.	Mean temperature of dew-point, Fahrenheit.	Precipitation, in inches.		Winds.				No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.				Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.				Mean.	Monthly range.	Daily ranges.								Total movement, miles.	Prevailing direction.	Maximum velocity.					
					Highest barometer.	Date.	Lowest barometer.	Date.				Max.	Date.	Mean max.	Min.	Date.	Mean min.		Greatest.	Date.	Least.	Date.						Miles p. h.	Direction.	Date.				
Upper Miss. Valley.										56.6 — 6.3														6.10 + 2.11							
Saint Paul	831	29.00	—.03	29.90	30.35	7	29.50	10	0.85	49.8 — 9.2		77.5	22	57.7	28.6	13	42.6	48.9	24.3	14	3.4	24	80.0	43.5	4.75 + 1.51	4,644	nw.	26	nw.	12	19	19	7	5
La Crosse	744	29.13	—.02	29.93	30.33	7	29.48	3	0.85	51.7 — 9.3		79.0	22	58.9	32.0	13	45.3	47.0	24.1	10	5.2	18	68.3	40.3	6.20 + 3.20	5,541	s.	25	sw.	10	16	18	9	4
Davenport	615	29.24	—.07	29.90	30.26	20	29.51	3	0.75	55.2 — 6.8		80.5	27	64.6	32.0	13	46.5	48.5	34.2	21	6.1	15	71.7	45.1	9.23 + 5.14	6,634	e.	60	se.	4	20	9	14	8
Des Moines	866	28.98	—.06	29.90	30.20	19	29.52	10	0.68	54.5 — 7.5		81.0	22	64.6	34.0	14	46.0	47.0	32.4	20	4.1	8	74.1	45.5	7.84 + 2.83	5,423	nw.	27	sw.	10	19	12	11	8
Dubuque	665	29.20	—.05	29.92	30.24	20	29.50	3	0.74	53.9 — 6.1		78.5	22	62.6	30.5	13	45.4	48.0	30.1	10	4.5	9	74.7	45.3	5.84 + 2.02	4,338	w.	25	nw.	12	15	12	13	6
Keokuk	618	29.22	—.07	29.88	30.20	20	29.42	27	0.78	58.0 — 6.0		83.0	27	67.9	36.0	14	48.8	47.0	27.9	21	6.7	8	71.1	47.6	5.06 + 1.06	6,555	e.	48	se.	2	13	7	11	13
Cairo	359	29.36	—.04	29.94	30.16	5	29.67	28	0.49	64.6 — 3.4		84.5	26	72.3	42.1	14	56.6	42.4	25.6	2	3.8	16	69.1	53.1	3.58 — 0.37	5,571	ne.	36	sw.	27	13	10	16	5
Springfield, Ill	644	29.25	—.06	29.93	30.27	20	29.56	28	0.71	58.8 — 5.2		85.2	27	69.1	34.6	14	49.1	50.6	28.9	5	5.5	18	69.9	47.9	8.61 + 3.88	5,158	se.	36	sw.	27	12	10	13	8
Saint Louis	571	29.30	—.07	29.91	30.19	20	29.58	28	0.61	63.1 — 2.9		87.5	27	72.6	40.0	14	53.7	47.5	27.4	2	8.0	18	65.5	50.1	3.81 — 0.24	8,862	se.	46	s.	3	12	7	17	7
Missouri Valley.										64.9 — 6.4														6.17 + 2.54							
Lamar	1,038	28.86	.....	29.94	30.26	14	29.62	27	0.64	62.5		83.6	26	74.2	36.8	1	51.9	46.8	36.4	1	10.4	27	71.4	52.1	5.63 + 1.85	7,413	s.	48	w.	15	13	9	13	9
Springfield, Mo	1,356	28.49	—.06	29.90	30.20	14	29.59	3	0.61	62.1 — 3.9		82.0	23	73.5	34.5	1	51.6	47.5	35.0	1	9.0	28	67.0	49.8	7.30	7,397	se.	50	sw.	27	10	8	11	12
Leavenworth	842	29.00	—.06	29.88	30.24	14	29.53	2	0.71	60.5 — 4.5		82.8	26	71.5	36.5	1	50.2	46.3	31.8	30	6.0	17	64.2	47.3	7.70 + 3.75	5,197	n.	30	s.	2	13	8	14	9
Topeka										60.6		87.2	30	74.3	29.9	19	45.8	57.3	41.5	29	8.1	17	68.6	48.6	0.87	.....	.....	.....	.....	.....	10	8	16	7
Omaha	1,113	28.74	—.04	29.92	30.26	14	29.47	2	0.79	55.9 — 7.1		84.0	21	66.8	36.7	1	47.9	47.3	30.6	4	6.0	8	68.5	44.4	4.36 — 0.38	6,629	nw.	29	nw.	3	16	15	11	5
Valentine	2,614	27.20	.....	29.90	30.30	7	29.60	10	0.70	50.9 — 8.1		77.3	31	61.3	32.0	18	41.6	45.3	38.2	4	7.5	16	74.8	42.0	9.35 + 6.42	9,308	n.	42	n.	27	20	13	13	5
Fort Sully	1,600	28.23	+.03	29.93	30.38	7	29.54	10	0.84	52.3 — 6.7		74.4	25	64.0	29.7	12	41.9	44.7	38.0	14	7.7	2	84.3	39.2	2.63 — 0.19	7,670	nw.	45	e.	15	13	8	17	6
Huron	1,307	28.53	—.01	29.93	30.34	7	29.55	10	0.79	50.4 — 6.6		74.3	9	61.2	24.2	12	39.8	50.1	38.0	14	6.7	2	64.9	37.1	4.98 — 1.64	8,260	nw.	36	nw.	11	14	11	16	4
Yankton	1,234	28.59	—.03	29.90	30.23	14	29.47	10	0.76	52.3 — 7.7		79.1	20	61.4	32.0	14	44.5	47.1	32.0	14	3.1	7	74.8	43.4	8.56 + 4.32	6,909	nw.	36	s.	20	20	17	11	3
Northern slope.										49.8 — 8.4														2.85 + 0.91							
Fort Assiniboine	2,720	27.14	+.02	29.95	30.41	6	29.58	10	0.83	50.5 — 3.5		76.7	8	62.1	30.8	18	39.6	45.9	37.0	7	6.2	5	63.7	36.9	2.04 — 0.88	6,951	e.	46	w.	9	12	13	13	5
Fort Custer	3,040	26.80	—.02	29.94	30.39	7	29.52	1	0.87	52.2 — 2.8		80.5	14	63.2	30.7	3	40.2	49.8	38.8	14	8.8	23	65.8	39.0	2.28 0.00	5,689	n.	36	nw.	8	21	9	16	6
Fort Maginnis	4,340	25.53	.00	29.94	30.40	6	29.53	1	0.87	44.6 — 4.4		72.0	8	55.0	29.3	12	35.6	42.7	37.5	8	6.5	5	72.0	34.9	3.21 + 2.42	6,536	nw.	40	nw.	10	17	13	15	3
Helena	4,069	25.79	—.01	29.92	30.31	6	29.50	1	0.81	50.1 — 1.9		78.0	13	60.5	31.5	17	41.5	46.5	33.5	13	4.5	5	03.8	36.9	2.96 + 1.81	5,768	sw.	33	sw.	10	16	17	12	2
Poplar River	2,030	27.64	.....	29.95	30.44	6	29.57	9	0.87	50.0 — 4.0		79.0	14	63.7	23.2	12	37.5	55.8	43.8	12	7.6	2	61.7	35.8	0.77 — 0.61	5,795	se.	36	nw.	28	10	5	14	16
Cheyenne	6,105	23.94	—.03	29.90	30.44	7	29.54	1	0.94	47.6 — 2.4		78.0	14	60.4	27.0	7	36.6	51.0	41.0	14	13.1	7	59.9	30.9	3.74 + 1.67	7,930	n.	39	nw.	17	22	14	11	6
Fort Laramie										53.4		84.4	14	66.5	27.0	18	40.4	26.1	44.1	14	9.0	21	.....	.....	4.21	.....	n.	.....	.....	.....	19	.....	.....	.....
North Platte	2,841	26.97	—.04	29.92	30.22	7	29.47	1	0.75	54.0 — 5.0		85.3	20	65.2	31.8	18	44.3	53.5	38.0	31	4.8	7	71.1	43.2	4.93 + 1.95	8,936	n.	54	n.	3	16	11	13	7
Rapid City		26.56	.....	.....	.....	.....	.....	.....	.....	49.4		75.0	14	59.9	22.4	18	40.4	52.6	36.0	18	7.6	21	70.8	39.0	6.01	9,579	nw.	38	n.	15	19	16	10	5
Fort Washakie		24.38	.....	.....	.....	.....	.....	.....	.....	48.5		80.0	14	60.4	25.0	18	36.6	55.0	39.0	14	8.5	6	68.5	37.1	5.57	4,932	sw.	36	sw.	19	14	14	13	4
Fort McKinney		24.95	.....	.....	.....	.....	.....	.....	.....	47.9		72.0	14	56.0	29.0	3	38.9	43.0	30.0	8	8.0	6	71.2	38.1	6.82	7,006	nw.	36	nw.	10	13	15	9	7
Fort Robinson										.....		.....		.....	.....		.....	.....	.....		.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Middle slope.										58.9 — 1.7														3.05 — 0.94							
Colorado Springs		.....	.....	.....	.....	.....	.....	.....	.....	52.4		77.0	14	65.4	30.0	1	39.9	46.0	42.7	1	13.2	7	55.2	34.7	2.42	.....	.....	.....	.....	.....	14	6	23	2
Denver	5,281	24.68	—.02	29.86	30.41	7	29.40	1	1.01	53.2 — 2.8		85.0	14	66.1	31.5	7	41.5	53.5	43.0	14	7.0	27	55.7	35.0	2.66 — 0.12	5,163	n.	36	n.	6	16	9	15	7
Pike's Peak	14,134	17.73	.....	29.90	30.29	28	29.58	10	0.71	21.3		39.5	14	28.5	6.7	3	16.1	32.8	19.0	12	5.1	27	81.1	16.0	2.40 — 1.30	16,915	nw.	80	w.	2	21	2	23	6
Las Animas	3,899	25.93	—.06	29.81	30.21	7	29.37	2	0.85	59.5 — 0.5		87.2	14	73.6	35.3	18	45.5	51.9	43.0	14	13.8	27	49.3	37.2	0.58 — 1.87	6,857	e.	36	n.	27	6	7	18	6
Concordia	1,384	28.42	.....	29.87	30.25	14	29.57	2	0.80	58.9 — 2.1		89.0	2	70.8	30.8	14	48.5	52.2	35.0	1	4.3	17	64.3	45.6	3.98 — 0.47	6,331	se.	46	nw.	27	10	9	16	6
Dodge City	2,524	27.28	—.04	29.89	30.24	14	29.40	2	0.84	60.5 — 1.5		84.3	2	74.2	39.0	18	48.8	45.3	35.5	29	13.2	5	68.6	48.4	2.86 — 1.11	10,791	se.	50	se.	5	9	4	16	11
Fort Reno										65.7		87.5	15	77.9	44.0	12	53.5	43.5	.....	.....	.....	.....	.....	.....	5.02 + 0.31	.....	s.	.....	.....	.....	10	.....	.....	.....
Fort Supply										63.0		90.4	15	75.7	40.3	19	50.4	50.1	37.6	2	10.5	5	.....	.....	3.71 — 0.87	.....	se.	.....	.....	.....	8	.....	.....	.....
Fort Elliott	2,650	27.14	—.04	29.82	30.15	12	29.41	2	0.74	62.4 — 1.6		93.6	15	76.2	40.0	20	49.2	53.6	36.9	30	13.1	11	65.7	49.1	3.19 — 2.13	10,631	s.	58	n.	11	8	4	12	15
Southern slope.										67.7 — 2.0														2.00 — 0.38							
Fort Sill	1,200	28.65	—.04	29.89	30.18	14	29.59	2	0.59	66.6 — 2.4		90.0	23	77.6	44.8	4	55.2	45.2	32.7	31	11.0	3	73.2	56.9	3.01 — 1.61	8,594	s.	36	e.	28	7	3	18	10
Abilene	1,748	28.06	—.05	29.87	30.14	12	29.58	11	0.56	69.6 — 2.4		94.7	26	80.6	50.5	29	59.6	44.2	30.3	31	12.0	16	80.6	59.6	3.63 + 1.49	9,198	s.	42	sw.	17	5	3	15	13
Fort Davis	4,928	25.11	—.06	29.84	30.08	12	29.62	10	0.46	60.8 — 1.2		87.3	11	78.2	45.0	7	54.7	42.3	34.5	25	14.0	18	35.6	33.3	1.11 — 0.24	5,572	sw.	34	n.	16	7	0	17	14
Fort Stanton	6,154	23.89	.....	29.73	30.01	29	29.46	2	0.55	56.6		79.8	15	70.3	33.4	30	41.2	46.4	39.4	20	17.7	27	39.1	30.2	0.25 — 0.77	6,113	w.	42	w.	15	3	3	10	18
Southern plateau.										64.9 — 0.7														0.38 + 0.04							
El Paso	3,796	26.12	—.06	29.82	30.03	29	29.58	10	0.45	71.4 — 0.6		93.1	14	84.6	47.2	19	56.4	45.9	34.0	25	19.2	5	31.4	36.7	0.15 — 0.27	6,272	w.	34	nw.	21	2	0	3	28
Lava										66.6		94.0	13	35.1	39.9	19	48.1	54.1	44.0	13	22.8	5	.....	.....	c.09 — 0.32	.....	sw.	.....	.....	.....	4	.....	.....	.....
Santa Fé	7,026	23.21	—.05	29.87	30.20	29	29.63	10	0.57	53.4 — 1.6		76.5	13	65.4	33.5	28	42.1	43.0	32.4	13	14.5	5	36.8	23.1	0.70 — 0.20	5,211	e.	33	w.	2	4	3	17	11
Fort Apache	5,020	.....	.....	.....	.....	.....	.....	.....	.....	59.8		92.4	14	79.8	32.0	27	39.9	60.4	47.2	14	19.0	5	.....	.....	0.71 + 0.18	.....	sw.	.....	.....	.....	1	.....	.....	.....
Fort Bowie										66.8		91.0	13	78.2	47.3	6	55.3	43.7	.....	.....	.....	.....	.....	.....	0.46 + 0.35	.....	sw.	.....	.....	.....	4	.....	.....	.....
Fort Grant	4,860	25.12	—.06	29.85	30.07	8	29.72	10	0.35	64.4 — 1.6		86.0	12	76.3	44.2	6	52.7	41.8	29.4	12	12.4	5	31.0	31.4	0.18 — 0.17	4,384	nw.	30	e.	29	2	2	4	25
Fort McDowell		.....	.....	.....	.....	.....	.....	.....	.....	74.2		107.0	12	93.4	47.0	27	55.1	60.0	46.0	13	20.0	5	.....	.....	0.40 + 0.29	.....	w.	.....	.....	.....	1	.....	.....	.....
Fort Thomas	2,710	.....	.....	.....	.....	.....	.....	.....	.....	69.0		101.0	12	85.6	45.2	27	52.4	56.9	47.0	13	23.9	15	.....	.....	0.23 — 0.36	.....	s.	.....	.....	.....	2	.....	.....	.....
Fort Verde		.....	.....	.....	.....	.....	.....	.....	.....	66.4		97.1	13	84.3	40.0	6	48.6	57.1	47.3	11	15.4	5	.....	.....	0.96 + 0.62	.....	.....	.....	.....	.....	5	.....	.....	.....
Phœnix		.....	.....	.....	.....	.....	.....	.....	.....	69.7		104.0	13	79.9	53.0	25	59.6	51.0	46.0	28	24.0	25	.....	.....	0.30	.....	.....	.....	.....	.....	2	.....	.....	.....
Prescott	5,389	24.65	—.04	29.85	30.04	7	29.66	1	0.38	58.6 + 0.6		85.0	12	73.1	33.5	3	43.2	51.5	40.0	28	14.0	5	55.9	40.7	0.96 + 0.47	5,968	sw.	36	sw.	25	3	3	9	19
San Carlos		.....	.....	.....	.....	.....	.....	.....	.....	71.4		102.0	13	90.1	42.0	26	52.6	60.0	46.5	12	26.0	6	.....	.....	0.10 — 0.21	.....	s.	.....	.....	.....	1	.....	.....	.....
Willcox		.....	.....	.....	.....	.....	.....	.....	.....	64.5		96.0	13	85.7	35.0	27	43.3	61.0	60.0	24	25.5	15	.....	.....	0.14 — 0.02	.....	w.	.....	.....	.....	3	.....	.....	.....
Yuma	141	29.65	—.04	29.79	29.96	8	29.58	10	0.38	76.9 — 0.1		102.0	10	91.6	54.0	23	60.4	48.0	40.0	10	22.0	25	37.5	44.9	0.0 — 0.04	5,395	w.	26	w.	25	0	0	3	28
Keeler	3,622	26.19	.....	29.76	29.95	8	29.51	1	0.44	66.5		87.8	10	77.2	40.7	26	53.7	47.1	30.5	6	14.8	14	33.9	35.6	0.30 + 0.29	5,282	s.	35	s.	15	5	1	14	16
Middle plateau.										57.7 + 1.2														1.02 — 0.24							
Fort Bidwell	4,640	25.32	.....	29.93	30.14	11	29.77	19	0.37	53.8		87.4	13	67.5	27.5	2	39.4	59.9	44.4	11	14.4	26	61.4	39.2	1.50 — 0.06	4,602	w.	36	sw.	14	10	6	16	9
Winnemucca	4,344	25.56	—.01	29.89	30.10	11	29.64	19	0.46	56.8 + 1.8		90.0	13	69.3	23.0	2	40.1	67.0	44.4	13	13.8	3	34.5	22.3	0.52 — 0.26	7,508	w.	39	e.	14	8	4	14	13
Brock's Ranch		.....	.....	.....	.....	.....	.....	.....	.....	58.5		88.4	13	77.8	32.8	9	39.2	55.6	50.9	18	28.7	25	.....	.....	1.48	.....	sw.	.....	.....	.....	12	.....	.....	.....
Salt Lake City	4,348	25.52	—.05	29.82	30.15	11	29.51	1	0.64	58.6 + 0.6		84.0	13	69.6	38.1	2	47.5	45.9	35.0	13	11.5	4	47.7	37.7	0.34 — 1.58	4,562	nw.	28	ne.	22	8	10	15	6
Montrose	5,780	24.20	.....	29.80	30.15	8	29.46	1	0.69	55.1		81.2	14	68.5	32.2	8	41.6	49.0	38.3	14	11.7	6	47.6	32.7	0.84 — 0.34	4,768	se.	36	s.	20	5	7	17	7
Fort Bridger	6,643	23.44	.....	29.89	30.32	7	29.55	16	0.97	46.9		76.5	14	58.8	26.7	18	35.3	49.8	35.9	14	8.6	7	58.4	31.2	1.91 + 1.05	6,009	w.	58	w.	10	12	11	16	4
Carson City		.....	.....	.....	.....	.....	.....	.....	.....	56.1		83.6	12	69.3	30.7	2	41.8	52.9	43.3	12	11.2	3	42.1	30.5	1.11	.....	.....	.....	.....	.....	7	2	10	19
Du Chesne		24.94	.....	.....	.....	.....	.....	.....	.....	56.1		75.0	30	70.8	34.0	26	38.8	41.0	44.5	11	12.7	6	53.1	35.9	0.69	3,671	sw.	58	.....	21	5	4	18	9
Northern plateau.										61.5 + 3.8														1.75 + 0.53							
Boisé City	2,750	27.07	—.05	29.87	30.19	11	29.59	25	0.60	59.9 + 1.9		90.0	14	73.9	31.6	11	45.0	58.4	46.6	13	16.1	3	49.5	38.5	0.94 — 0.20	3,379	w.	24	n.	30	8	5	13	12
Ashland		.....	.....	.....	.....	.....	.....	.....	.....	60.9		91.6	12	77.5	34.6	21	44.3	57.0	48.0	6	10.3	25	.....	.....	2.24 + 0.53	.....	nw.	.....	.....	.....	11	.....	.....	.....
Fort Klamath		.....	.....	.....	.....	.....	.....	.....	.....	50.2		86.0	13	66.4	22.0	21	34.0	64.0	49.0	11	9.0	25	.....	.....	2.60 + 1.53	.....	w.	.....	.....	.....	11	.....	.....	.....
Lakeview		.....	.....	.....	.....	.....	.....	.....	.....	52.4		87.0	13	67.2	26.0	2	37.5	61.0	39.0	13	8.0	25	.....	.....	2.80 + 1.64	.....	s.	.....	.....	.....	9	.....	.....	.....
Linkville		.....	.....	.....	.....	.....	.....	.....	.....	54.5		86.8	13	68.3	26.2	2	40.7	60.6	39.5	2	9.4	25	.....	.....	2.19 + 0.84	.....	nw.	.....	.....	.....	9	.....	.....	.....
Spokane Falls	1,909	27.89	—.06	29.88	30.23	6	29.60	30	0.63	59.8 + 3.8		91.5	29	72.7	34.9	21	44.7	56.6	40.5	13	13.1	1	59.8	43.4	1.24 + 0.07	3,632	ne.	28	sw.	8	6	10	13	8
Walla Walla	1,018	28.82	—.10	29.90	30.22	11	29.59	25	0.63	64.8 + 5.8		95.0	3	77.2	40.6	11	50.8	54.4	35.4	13	13.0	3	38.2	36.0	0.21 — 0.67	5,041	sw.	30	sw.	9	3	5	7	19
N. Pac. coast region.										55.7 + 3.0														0.32 — 2.45							
Fort Canby	179	29.79	.....	29.99	30.27	8	29.71	29	0.56	53.1 + 2.1		78.3	6	60.2	43.0	5	47.3	35.3	29.4	6	5.6	1	77.6	45.7	0.49 — 2.77	6,877	nw.	36	s.	9	9	14	7	10
Neah Bay		.....	.....	.....	.....	.....	.....	.....	.....	52.9		75.0	16	63.3	34.5	5	42.5	40.5	32.5	5	9.5	2	.....	.....	1.67 — 3.76	.....	sw.	.....	.....	.....	5	.....	.....	.....
Olympia	36	29.94	—.07	29.98	30.24	11	29.67	30	0.57	57.4 + 3.4		88.0	30	71.1	34.0	11	43.0	54.0	41.0	28	9.0	9	64.4	43.9	0.21 — 2.63	2,516	n.	18	ne.	15	4	4	8	19
Port Angeles	14	29.96	—.04	29.97	30.20	11	29.64	30	0.56	50.7 + 1.7		74.0	30	59.4	32.7	19	40.4	41.3	33.9	15	8.4	26	78.4	43.5	0.21 — 1.04	5,636	w.	30	w.	17	4	3	13	15
Pysht		.....	.....	.....	.....	.....	.....	.....	.....	56.0		71.0	14	60.9	34.0	5	41.2	37.0	32.0	14	7.5	2	.....	.....	0.59 — 1.66	.....	w.	.....	.....	.....	7	.....	.....	.....
Tatoosh Island	86	29.91	.....	30.00	30.23	8	29.70	30	0.53	49.8 — 0.2		71.7	15	55.6	42.2	9	46.2	29.5	21.1	16	4.1	2	86.4	45.5	1.63 — 3.92	7,860	sw.	48	e.	15	13	14	9	8
Astoria	20	20.94	.....	29.96	30.23	8	29.67	29	0.56	56.4 + 4.4		76.8	31	64.9	46.5	12	50.2	30.3	27.9	14	6.6	3	76.1	48.3	0.79 — 3.15	4,217	w.	24	e.	10	10	9	15	7
Portland	80	29.88	—.08	29.97	30.24	8	29.64	29	0.60	62.3 + 5.3		91.3	29	75.1	37.5	5	49.6	53.8	39.4	5	10.5	3	60.8	46.7	0.68 — 2.46	4,046	nw.	22	nw.	19	6	5	12	14
Roseburg	523	29.41	—.10	29.96	30.30	9	29.70	30	0.50	60.1 + 4.1		93.0	29	73.6	35.7	11	44.8	57.3	45.8	12	11.0	25	63.1	45.8	1.15 — 0.64	2,940	nw.	22	n.	30	8	7	12	12
Mid. Pac. coast reg.										59.6 — 1.4														0.43 — 0.30							
Eureka	50	29.94	.....	29.98	30.24	9	29.75	30	0.49	53.0 — 4.0		71.0	31	57.8	43.6	11	49.2	27.4	18.1	31	3.4	15	85.1	48.4	0.76	5,014	n.	36	w

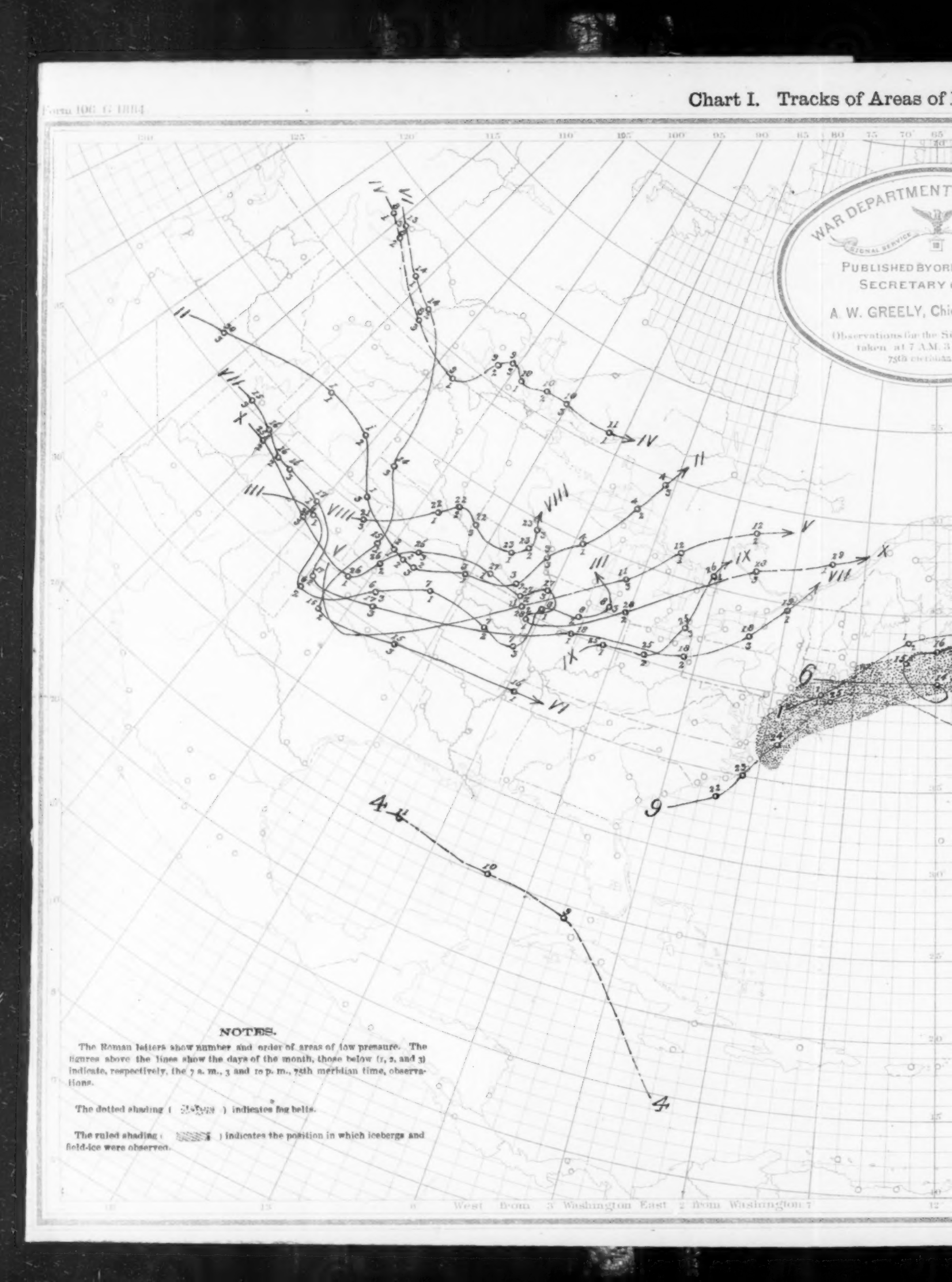
Meteorological record of voluntary observers and Army post surgeons, May, 1888.

The maximum and minimum temperatures at stations marked thus (*) are from readings of other than standard instruments.

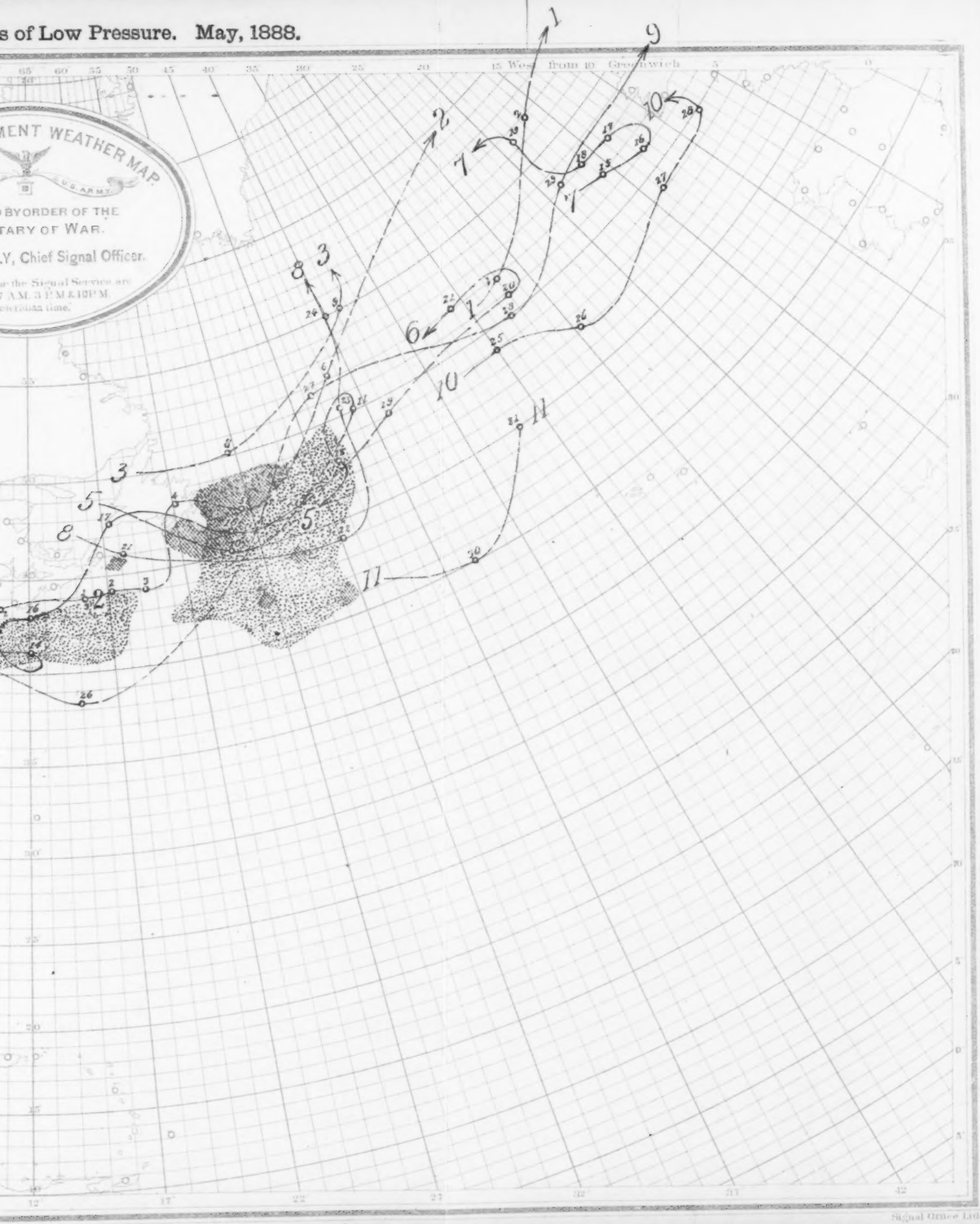
Stations.	Temperature. (Fahrenheit.) Max.	Min.	Mean.	Precip'n.
Alabama.	°	°	°	*Inches*
Livingston	91	50	68.7	3.38
Mt. Vernon B'ks	91	48	71.5	5.78
New Market*	73	62	62.8	3.62
Arizona.				
Cedar Springs	.....	.....	.....	0.30
Eagle Pass	.....	.....	.....	0.20
Huachuca, Fort	92	41	.....	0.60
McDowell, Fort	106	47	78.5	0.30
Mojave, Fort	104	38	.....	0.00
Tucson	.....	.....	.....	0.32
Williams	.....	.....	.....	0.14
Arkansas.				
Hot Springs	.....	42	68.7	8.96
Eureka Springs	84	41	65.0	8.18
Lead Hill	93	37	66.9	8.95
British Columbia.				
New Westminster	86	41	58.4	1.40
California.				
Alcatraz Island	64	47	54.3	0.50
Angel Island	77	.....	54.8	0.25
Banning	87	43	.....	0.90
Benicia Barracks	83	50	59.4	0.33
Bidwell, Fort	93	30	.....	1.37
Gaston, Fort	91	31	57.1	1.36
Georgetown	82	40	58.3	0.38
Hydesville	81	38	.....	1.06
Lewis Creek*	97	52	75.0	0.13
Mason, Fort	.....	.....	56.3	0.40
Nicolaus	91	54	64.7	0.55
Oakland	73	50	57.0	0.38
Oroville	90	51	69.2	0.32
Presidio of San F	72	41	55.1	0.60
Riverside*	86	46	63.6	0.04
Sacramento	89	41	61.8	0.39
Salinas	74	51	57.0	0.89
Santa Barbara	72	52	62.8	.....
Santa Maria	81	46	61.6	0.14
Willows	100	43	67.9	0.16
Colorado.				
Fort Collins	84	30	53.3	3.39
Georgetown	69	27	45.1	2.83
Lewis, Fort	78	26	48.8	0.24
Connecticut.				
Hartford	83	32	58.4	4.49
New Hartford	79	28	52.9	3.98
Voluntown	84	40	.....	4.80
Dakota.				
A. Lincoln, Fort	76	18	51.2	0.64
Davenport	72	21	49.7	1.82
Garden City	72	23	47.2	2.25
Gallatin*	.....	.....	41.0	.....
Kimball	80	29	46.4	4.00
Meade, Fort	75	31	.....	3.94
Parkston	78	30	52.1	8.98
Pembina, Fort	80	15	.....	0.56
Randall, Fort	73	29	.....	5.66
Richardton	70	28	46.6	0.86
Sisseton, Fort	70	14	49.0	1.90
Sully, Fort	80	30	53.5	2.45
Totten, Fort	.....	21	47.9	0.57
Webster	74	23	52.1	2.09
Woonsocket	80	22	51.2	4.56
Yates, Fort	79	23	.....	0.80
District of Columbia.				
Distribut'g res'v'r*	89	40	64.8	5.47
Kendall Green	87	46	61.9	4.86
Receiving res'v'r*	89	44	65.4	4.60
Aqueduct office*	93	50	68.8	.....
Florida.				
Alva*	90	64	74.0	5.35
Archer	97	52	.....	9.16
Duke	88	58	72.3	3.99
Fort Meade*	91	65	78.0	5.95
Homeland*	92	60	78.0	0.05
Limona*	93	61	79.9	4.66
Manatee	93	53	77.1	6.28
Merritt's Island	89	64	75.2	2.46
St. Francis Bar'cks	85	61	74.2	4.65
Tallahassee	91	57	74.5	10.40
Georgia.				
Athens	92	41	69.0	5.85
Marietta	85	54	64.3	3.11
Milledgeville*	90	47	72.0	5.88
Idaho.				
Boisé Barracks	87	35	61.7	0.26
Lewiston	90	48	.....	1.13
Sherman, Fort	90	32	54.8	0.56
Illinois.				
Collinsville	88	38	.....	5.68
Jacksonville	84	35	60.2	5.34
Mount Morris	80	36	56.1	.....
Oswego	84	34	54.0	4.67
Palestine	87	32	60.3	2.40
Pekin	83	33	60.7	7.81
Philo	84	36	58.7	6.68
Rockford	81	29	53.5	6.25
Riley	78	31	51.7	4.48
Sandwich*	86	36	58.7	5.14
South Evanston	83	39	.....	4.88
Sycamore	81	33	52.9	5.50
Windsor	85	36	60.1	5.34
Indiana.				
Butlerville*	91	35	64.5	3.32
Jeffersonville	90	37	64.4	2.47
Laconia	93	32	63.4	2.57
La Grange	83	32	58.4	4.04
Maxy	86	31	59.3	4.83
Sunman*	85	32	61.8	3.70
Vevay	90	32	62.2	2.51
Indian Territory.				
Gibson, Fort	87	37	67.9	5.24
Reno, Fort	85	43	64.8	4.43
Supply, Fort	85	40	62.0	2.72
Iowa.				
Amana	83	29	54.1	7.55
Ames	78	30	43.0	6.49
Auburn	70	42	56.8	3.94
Bancroft	80	30	51.4	8.45
Cedar Rapids a	80	25	52.8	8.10
Clear Lake	81	30	49.0	7.04
Clinton	88	28	55.3	6.46
Clarinda	84	39	57.6	7.75
Cresco	77	30	49.9	7.34
Cromwell	.....	.....	.....	10.85
Des Moines	82	33	55.6	.....
Denmark	78	45	61.7	5.13
Dysart	76	33	46.0	6.30
Elkader	80	32	53.0	5.25
Fairfield	85	42	57.5	9.32
Fort Madison	83	41	.....	5.54
Glenwood a*	80	38	59.1	6.11
Glenwood b	84	28	59.9	.....
Grinnell	77	33	54.1	6.85
Humboldt	79	26	.....	5.54
Hampton	81	22	.....	7.87
Independence*	73	35	52.5	5.54
Iowa City	73	33	52.5	6.70
Manson*	76	34	55.2	3.83
Maquoketa*	82	41	65.9	5.46
Monticello*	82	28	53.9	6.10
Mount Vernon*	87	32	57.2	6.88
Muscatine	82	29	55.0	6.78
Osage	.....	.....	.....	7.89
Osceola	67	33	52.3	8.34
Oskaloosa a	.....	.....	.....	5.61
Oskaloosa b	71	47	58.8	6.40
Sac City	76	34	50.3	6.05
Smithland	.....	.....	.....	11.20
Vinton	78	36	52.5	5.63
Kansas.				
Allison	87	38	68.6	6.94
Cawker City	84	43	58.6	3.30
East Norway	83	42	59.7	5.80
Elk Falls	86	35	.....	2.80
Emporia	80	63	70.0	2.08
Gibson	90	38	58.2	2.98
Globe	86	44	61.7	1.12
Hays, Fort	85	32	59.4	3.18
Independence	86	41	64.6	4.82
Lawrence	83	38	62.1	1.97
Manhattan a	88	44	65.0	2.22
Lebo	89	36	61.8	2.42
Morse*	84	38	61.0	3.75
Ninnescah	94	39	.....	2.02
Ottawa	85	34	61.6	1.31
Riley, Fort	88	38	.....	1.58
Rome	90	41	62.9	4.64
Salina*	79	51	62.4	2.07
Scott	82	30	.....	2.64
Tribune	89	30	57.1	1.22
Wakefield*	90	45	62.6	4.27
Wellington	88	40	63.7	4.66
Wilson	90	33	60.6	2.39
Yates Centre	85	35.3	61.9	1.34
Kentucky.				
Frankfort	92	29	.....	3.93
Shelbyville	96	48	60.0	3.22
Louisiana.				
Luling	87	52	.....	7.47
Liberty Hill	98	46	70.0	3.78
Maine.				
Bar Harbor	70	30	.....	3.67
Cornish	78	32	50.6	.....
Gardiner	75	29	49.9	2.48
Kent's Hill	74	31	49.7	3.03
Orono	75	25	50.4	2.82
Maryland.				
Barron Creek Sp'gs	76	35	.....	.....
Cumberland	86	38	60.2	3.47
Great Falls*	89	43	65.5	3.07
McDonogh	84	43	61.0	3.66
McHenry, Fort	84	41	60.4	4.23
Mount St. Mary's	83	44	67.6	2.15
Woodstock	90	31	61.0	3.99
Massachusetts.				
Amherst a	82	28	55.9	4.52
Amherst b	80	26	54.7	4.29
Blue Hill Observ'y	82	31	51.0	3.91
Deerfield	83	27	55.0	4.52
Dudley	83	29	53.9	5.18
Fall River	87	30	52.3	6.75
Fitchburg	79	38	54.0	4.35
Milton	79	34	51.2	4.00
New Bedford	83	30	53.1	5.57
Provincetown	73	36	.....	3.94
Somerset	84	30	57.2	5.15
Westborough*	86	30	57.6	5.13
Williamstown	76	26	52.7	3.64
Worcester	81	34	53.1	5.40
Michigan.				
Adrian	85	22	55.4	2.70
Alma	82	23	51.8	3.92
Bear Lake	78	20	48.8	3.28
Benton Harbor	82	32	.....	4.09
Benzonia	75	24	48.3	4.40
Belle Branch	86	28	57.4	2.09
Birmingham	80	22	55.2	3.70
Buchanan	79	32	54.3	5.48
Big Rapids	82	24	52.6	2.89
Brady, Fort	74	25	.....	3.22
Concord	85	28	54.7	4.10
Coldwater	80	31	57.5	4.43
Cassipolis	80	32	56.3	5.55
Colon	82	36	55.7	6.15
Chelsea	80	26	52.3	3.62
Eden	83	28	55.1	3.98
East Taws	79	28	50.2	2.14
Hanover	80	31	55.1	2.83
Harrisville	76	22	46.6	2.40
Hart	88	18	52.5	2.67
Hillman	83	22	49.3	3.29
Hudson	85	19	.....	2.60
Ionia	82	30	53.4	4.26
Jonesville	81	30	53.9	3.35
Kalamazoo	76	35	55.2	4.92
Lansing	80	27	53.9	3.65
Lathrop	80	20	46.4	3.56
Mio	85	28	51.5	2.14
Maple Hill	.....	.....	43.5	2.80
Madison	.....	.....	54.0	2.13
Mottville*	82	30	55.0	5.11
Mount Morris	82	22	52.4	3.42
Ovid	81	26	53.2	4.22
Saint Louis	83	28	53.5	3.64
Saint Johns	81	27	54.0	4.77
Thornville*	83	25	54.9	2.78
Traverse City	81	22	46.0	3.97
Wilmington	78	32	53.0	3.87
West Branch	78	28	50.9	1.80
Minnesota.				
Minneapolis	77	30	49.8	6.21
Snelling, Fort	79	24	50.4	4.76
Mississippi.				
Biloxi	83	54	73.7	9.58
Jackson	90	52	70.9	4.06
Palo Alto	93	48	70.8	2.03
Missouri.				
Conception	76	35	56.8	6.94
Pierce City	88	38	64.8	4.60
Warrenton	85	45	66.0	.....
Montana.				
Keogh, Fort	76	31	.....	1.35
Missoula, Fort	.....	.....	.....	0.20
Shaw, Fort	81	30	53.1	.....
Virginia City	76	29	48.2	1.53
Nebraska.				
Culbertson	90	34	60.5	4.79
De Soto*	86	34	55.8	4.98
Fairbury	90	32	.....	4.40
Fremont*	84	34	54.9	4.64
Genoa	83	34	54.9	5.06
Grand Island	82	40	.....	9.32
Hay Springs	79	29	48.9	7.25
Kimball	84	27	.....	3.72
Marquette	84	35	.....	3.80
Niobrara, Fort	80	34	52.6	10.62
Robinson, Fort	.....	26	51.9	9.39
Sidney, Fort	.....	31	.....	4.42
Syracuse	82	44	59.2	8.09
Nevada.				
Carson City	87	28	56.7	1.05
McDermit, Fort	78	28	57.0	1.10
New Hampshire.				
Antrim	.....	.....	.....	5.95
Ashland	.....	.....	.....	5.05
Belmont	.....	.....	.....	3.48
Bristol	.....	.....	.....	4.39
Concord	81	29	.....	4.48
Lake Village	.....	.....	.....	3.83
Nashua	83	27	53.1	2.64
Wier's Bridge	.....	.....	.....	4.44
Wolfeborough	.....	.....	.....	3.75
New Jersey.				
Beverly	88	34	60.0	3.16
Clayton*	90	36	57.6	4.15
Egg Harbor City	90	33	57.6	6.48
Moorestown	84	36	59.0	3.16
Readington*	82	46	62.1	.....
South Orange	84	32	57.4	6.46
Vineland	83	37	60.0	5.48
New Mexico.				
Albuquerque	.....	.....	.....	0.39
Bayard, Fort	.....	.....	64.1	0.10
Gallinas Spring	84	42	.....	.....
Las Vegas	86	30	55.7	0.30
Selden, Fort	98	41	71.9	0.00
Union, Fort	77	34	55.5	0.70
Wingate	76	28	.....	0.24
New York.				
Ardenia	79	43	57.0	5.82
Auburn	78	34	56.2	4.29
Boyd's Corners	85	42	.....	6.17
Brooklyn	79	42	58.8	3.78
Columbus, Fort	78	39	57.0	4.64
Cooperstown	76	35	53.3	2.76
Eden	.....	.....	.....	2.32
Factoryville	81	26	56.5	2.08
Geneva	.....	.....	50.1	2.78
Humphrey	79	34	53.2	4.63
Ithaca	82	29	55.6	2.38
Lyons	80	37	54.4	1.69
Madison Barracks	82	26	.....	0.56
Niagara, Fort	77	32	50.2	.....
Palermo*	80	25	52.2	1.17
Plattsburg B'ks	83	16	54.4	3.20
Palmyra	81	.....	56.2	.....
Penn Yan	.....	.....	.....	4.19
Rose	80	33	53.8	2.50
Setauket	77	37	55.3	4.49
Utica	85	31	55.5	3.81
West Point	.....	.....	.....	6.22
White Plains	77	27	58.0	6.55
North Carolina.				
Chapel Hill	96	43	67.0	9.88
Hot Springs	88	34	63.8	.....
Marion	88	33	.....	.....
Statesville*	85	40	64.0	9.54
Tarborough	92	44	68.1	8.09
Weldon*	91	41	66.8	8.84
Ohio.				
Bellevue	.....	.....	56.2	3.05
Cleveland	80	34	56.8	3.70
College Hill*	87	40	59.9	8.50
Elyria	82	33	54.7	5.02
Garrettsville	80	25	54.5	2.42
Jacksonborough	84	32	59.8	5.10
Napoleon	86	36	60.2	3.00
New Athens	83	35	.....	.....
North Lewisburg	86	33	61.4	4.50
Portsmouth	88	38	61.7	3.70
Ruggles*	78	38	55.5	3.65
Tiffin*	83	37	57.3	3.98
Trumbull	80	26	57.6	2.15
Wauseon	84	23	55.2	3.36
Westerville	82	35	59.1	4.40
West Milton	86	39	62.0	7.50
Yellow Springs	81	34	57.3	4.05
Oregon.				
Albany	90	41	60.2	1.00
Bandon*	65	46	53.5	1.04
East Portland*	92	32	.....	0.04
Eola	85	45	59.1	1.08
La Grande	87	33	.....	0.73
Klamath, Fort	91	21	53.6	2.34
McMinnville	89	35	55.5	0.69
Yaquina Lt. House	80	39	51.1	1.34
Pennsylvania.				
Altoona	87	33	60.6	4.08
Catawissa	84	31	62.5	5.20
Corry*	82	26	55.3	2.80
Drifton	84	24	55.0	5.69
Dyberry	78	24	53.5	3.86
Grampian Hills	84	28	55.6	4.58
Hamilton	69	42	54.4	2.37
Meadville	80	.....	.....	2.69
Phillipsburg	91	24	53.6	4.66
Quakertown	85	29	57.1	3.02
Reading	87	33	60.8	4.27
State College	82	33	57.6	6.26
Troy	79	35	.....	.....
Wellsborough	80	30	54.9	3.16
West Chester	86	36	58.9	4.11
Westtown	89	35	60.2	2.88
South Carolina.				
Aiken	87	45	71.8	6.68
Blacks	.....	.....	.....	6.68
Cedar Springs	93	33	66.1	10.60
Graham's Turnout	91	56	.....	7.45
Kirkwood	81	48	67.8	9.15
Stateburg*	88	46	69.7	6.68
Tennessee.				
Ashwood	86	41	.....	4.08
Austin	88	34	68.0	2.86
Milan	89	42	67.0	1.90
Texas.				
Cedar Hill	89	55	66.0	13.00
Cleburne*	86	48	69.3	5.20
Colorado	94	50	.....	.....
Comanche	92	52	.....	3.89
Concho, Fort	98	51	.....	1.37
Corsicana	.....	.....	.....	12.33
Decatur	87	51	68.6	6.94
Gallinas	93	56	73.3	4.30
Lampasas	99	43	71.0	5.16
McIntosh, Fort	102	59	80.1	1.50
Mesquite	93	50	70.6	9.73
Mexia	87	58	72.0	7.15
New Ulm	89	53	72.6	7.74
Ringgold, Fort	105	60	80.7	1.21
Silver Falls	92	44	65.5	1.21
Vermont.				
Burlington	81	31	57.2	3.26
Lunenburg	78	25	51.3	4.55
Manchester	78	37	55.4	6.18
Middlebury	77	34	.....	3.06
Strafford*	76	32	53.7	3.60
St. Johnsbury	78	23	.....	3.00
Virginia.				
Bird's Nest*	90	48	63.6	4.75
Dale Enterprise*	90	38	65.1	5.04
Marion	90	30	61.0	3.87
Monroe, Fort	90	47	.....	7.35
Petersburg	88	42	66.0	8.30
Summit*	90	32	62.2	.....
University of Va	78	50	64.1	6.28
Variety Mills	88	37	63.0	7.10
Wytheville	84	32	60.5	3.73
Washington Territory.				
Blakely	83	37	57.7	0.53
Spokane, Fort	97	39	.....	0.40
Tacoma	83	46	59.0	0.58
Townsend, Fort	81	40	56.6	0.61
Vashon	90	42	59.4	0.08
Walla Walla, Fort	97	38	.....	0.06
West Virginia.				
Clarksburg*	84	31	63.5	3.08
Helvetia*	86	32	57.8	5.85
Hartmonsville	86	34	.....	.....
Middlebrook*	77	28	.....	.....
Parkersburg	85	36	61.2	3.96
White Sulphur	.....	.....	.....	3.35
Wisconsin.				
Beloit	78	33	52.2	5.60
Deuster	82	25	.....	5.00
Delavan	84	25	52.0	4.39
Embarras*	80	28	51.2	6.30
Fond du Lac	80	28	48.8	3.05
Fredonia	80	31	49.6	.....
Lancaster	82	29	51.5	5.05
Madison	78	32	51.7	3.70
Manitowoc	76	24	49.3	3.51
Prairie du Chien	81	35	53.5	5.47
Waucousta	65	22	.....	.....
Wyoming.				
Camp Sheridan	76	27	44.3	T.
Laramie, Fort	87	33	.....	2.46
McKinney, Fort	76	30	48.7	6.37
Washakie, Fort	77	29	.....	4.70

Form 106. C. 1884.

Chart I. Tracks of Areas of L

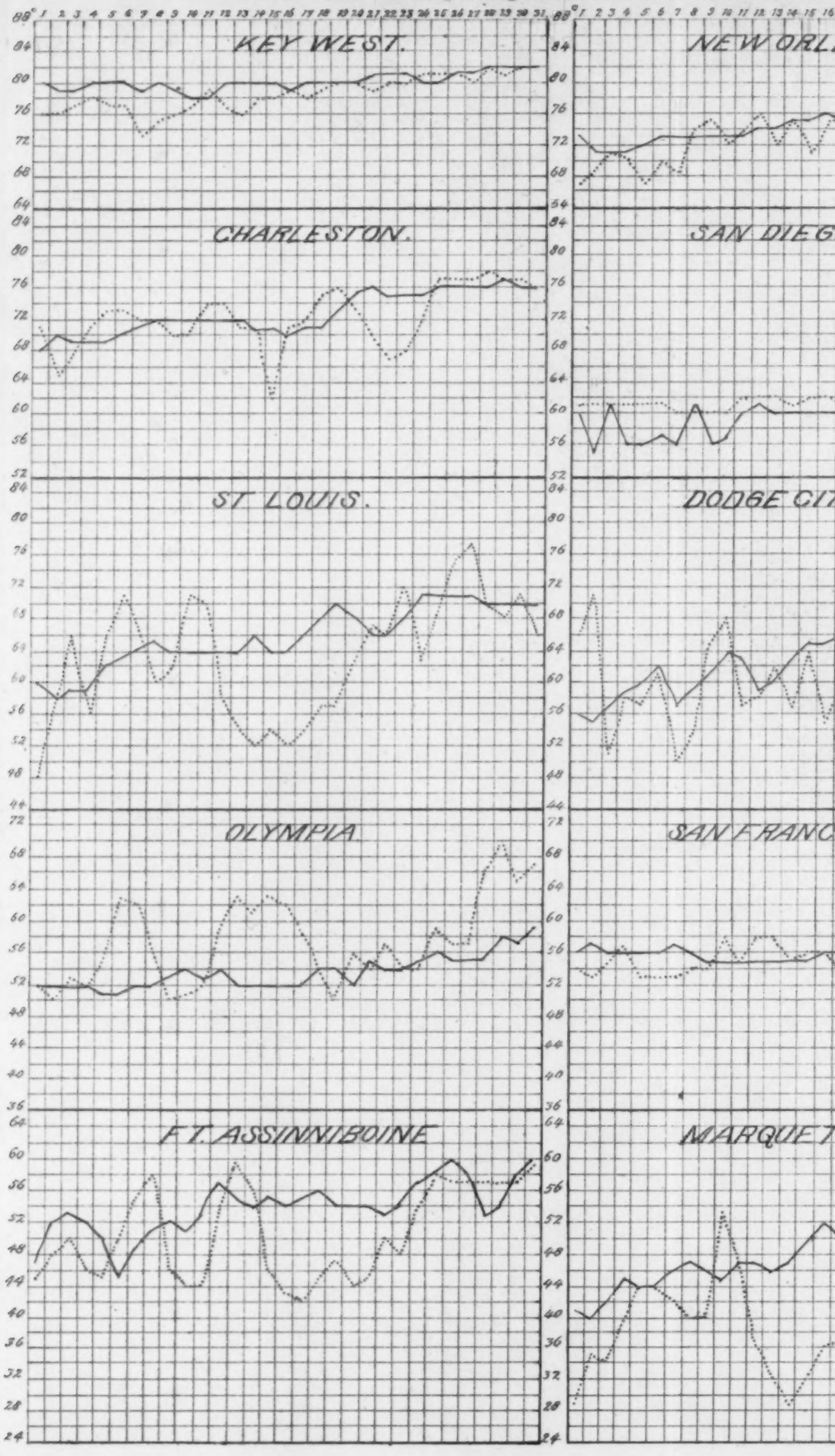

WAR DEPARTMENT
PUBLISHED BY OR
SECRETARY
A. W. GREELY, Chi
Observations for the S
taken at 7 A.M. 3
75th meridian
NOTES.
The Roman letters show number and order of areas of low pressure. The figures above the lines show the days of the month, those below (1, 2, and 3) indicate, respectively, the 7 a. m., 3 and 10 p. m., 75th meridian time, observations.
The dotted shading ( ) indicates fog belts.
The ruled shading ( ) indicates the position in which icebergs and field-ice were observed.
West from 3 Washington East 2 from Washington 7

s of Low Pressure. May, 1888.

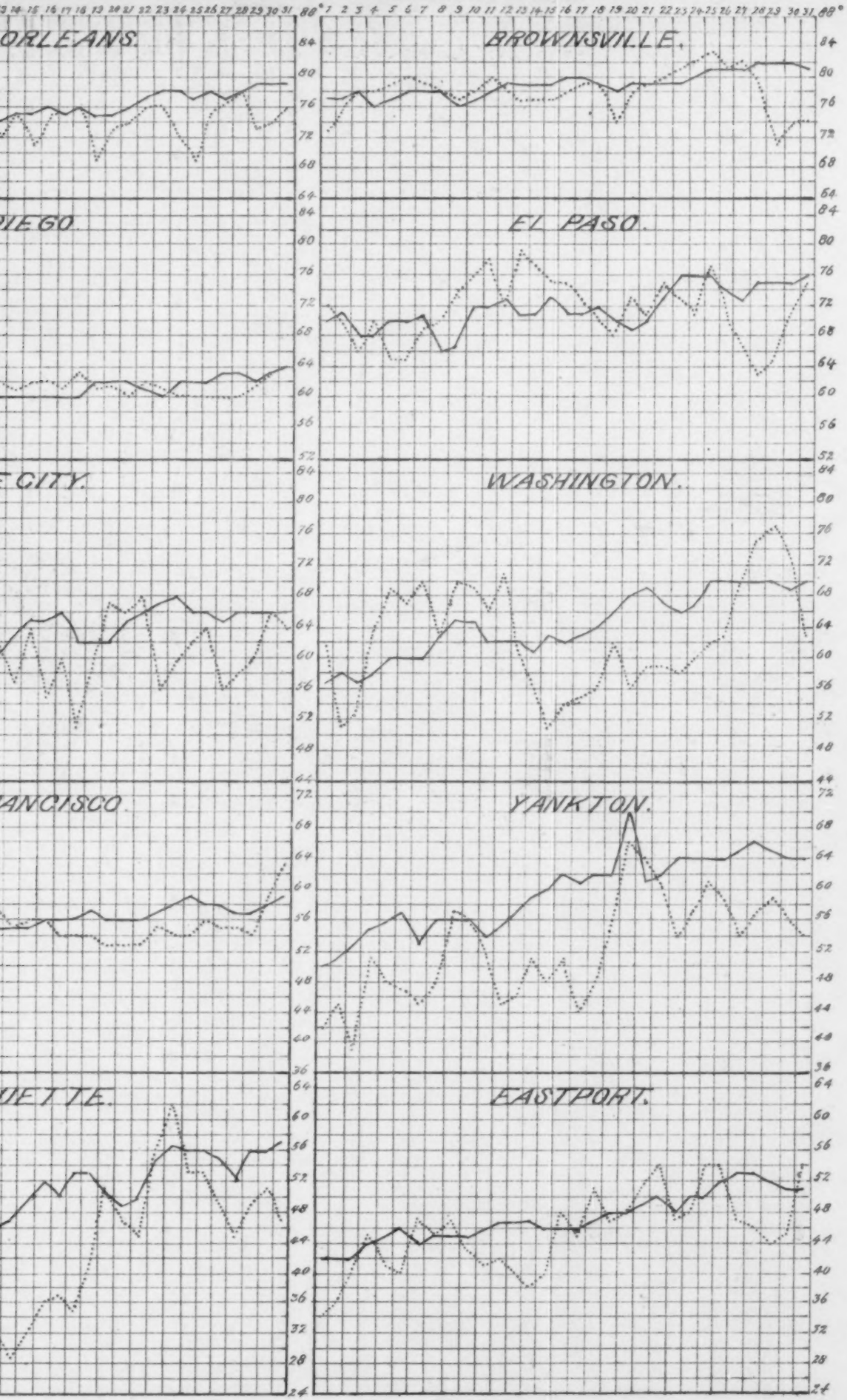


Signal Office Lith

Chart III. Normal May Temperatures for a number of years



years (———). **Mean temperature for May, 1888** (.....).



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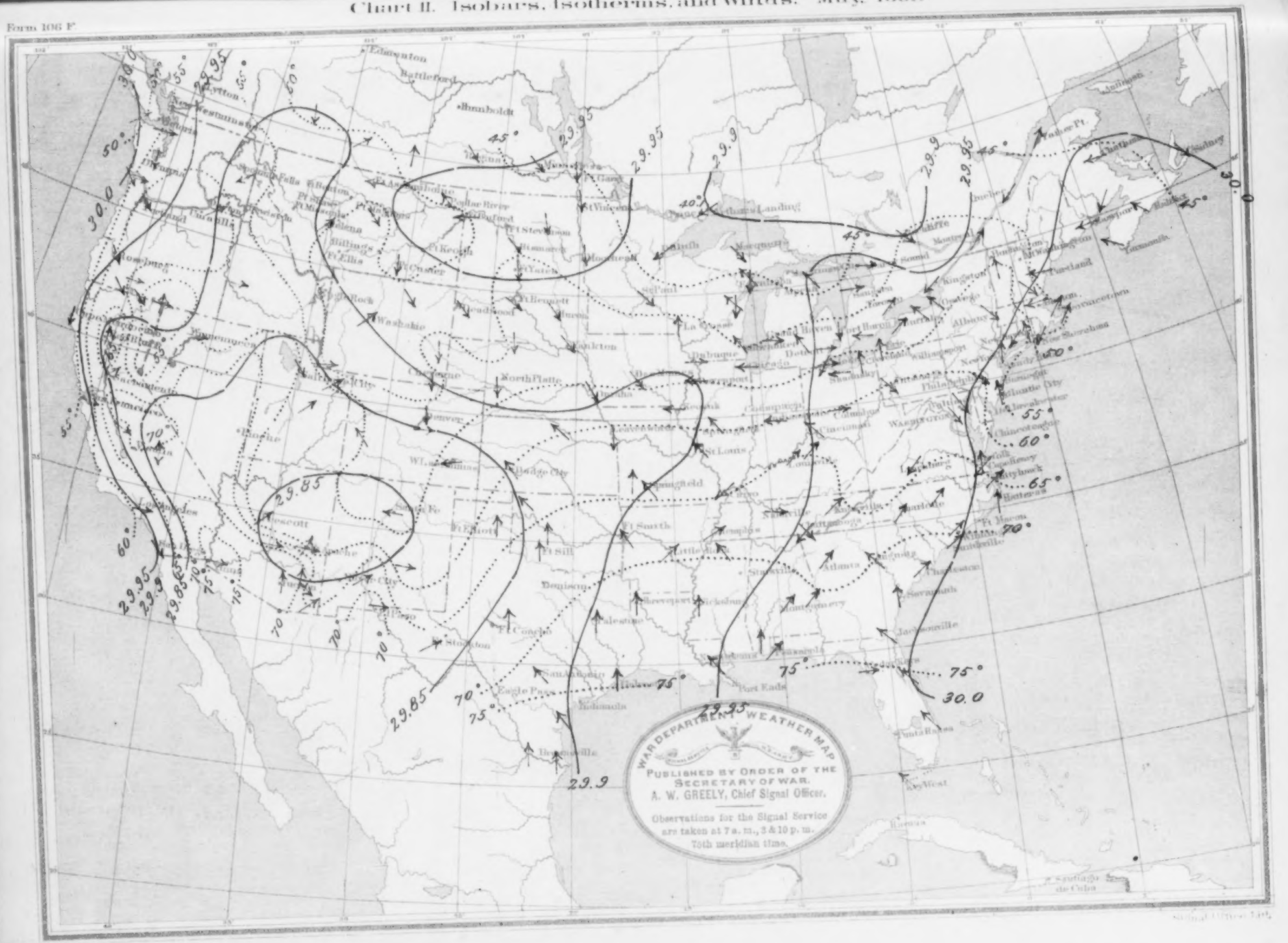
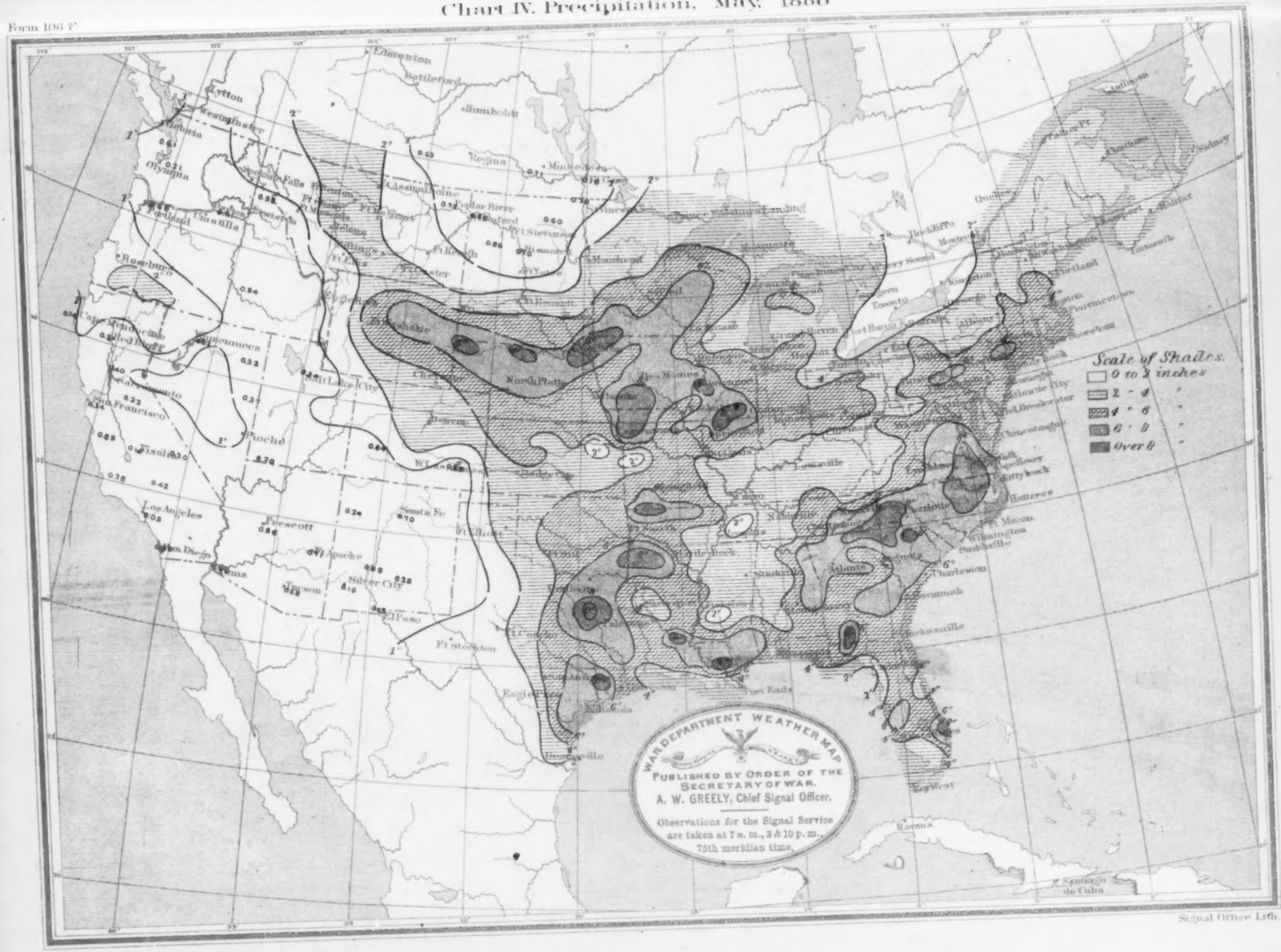
Form 106 F

Chart II. Isobars, Isotherms, and Winds. May, 1883


WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 7 a. m., 3 & 10 p. m. 75th meridian time.

Form 106 F

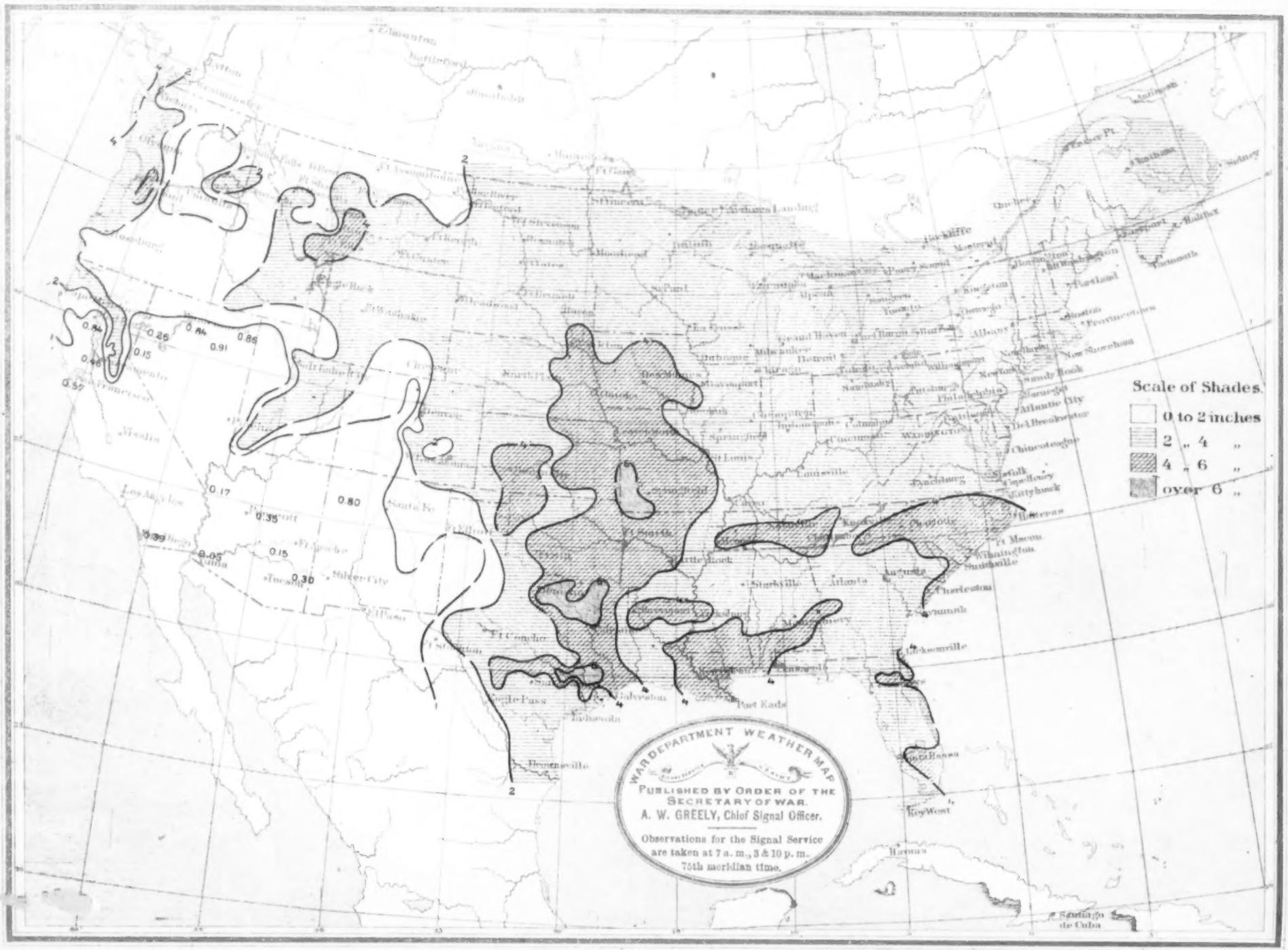
Chart IV. Precipitation, May, 1883


Scale of Shades.
0 to 2 inches
2 - 4 "
4 - 6 "
6 - 8 "
Over 8 "
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 7 a. m., 3 & 10 p. m., 75th meridian time.

Signal Office Lith.

Form 106. P

18 years Normal Precipitation Chart. May.


Scale of Shades.
0 to 2 inches
2 „ 4 „
4 „ 6 „
over 6 „
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 7 a. m., 3 & 10 p. m. 75th meridian time.

List of voluntary stations of the Signal Service, with their respective observers, from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for May, 1888.

Place of observation and observer.

Alabama.

Livingston, J. W. A. Wright.
New Market, Dr. Geo. D. Norris.

Arizona.

Cedar Springs, J. E. Norton.
Eagle Pass, R. B. Tripp.
Tevis, Miss Belle Tevis.
Tucson, Edward L. Wetmore.
Williams, J. T. Ryan.

Arkansas.

Eureka Springs, A. H. Foote.
Lead Hill, Silas C. Turnbo.

California.

Anderson, Dr. A. Fouch.
Banning, Welwood Murray.
Barstow, Geo. R. Gooding.
Georgetown, C. M. Fitzgerald.
Hydesville, E. T. Foss.
Lewis Creek, John Touhy.
Nicolaus, Alvah Pendleton.
Oakland, Dr. J. B. Trembley.
Oroville, Hiram Arents.
Riverside, A. K. Holt.
Salinas, Dr. E. K. Abbott.
Sacramento, S. H. Gerrish.
Santa Barbara, H. D. Vail.
Santa Maria, L. E. Blochman.
Willows, David Bentley.

Colorado.

Bennett, I. S. Putnam.
Fort Collins, Prof. V. E. Stolbrand.
Georgetown, W. A. Jayne, M. D.

Connecticut.

Hartford, Wm. R. Matson.
New Hartford, Wm. Goodwin.
Southington, Luman Andrews.
Voluntown, Rev. E. Dewhurst.

Dakota.

Brookings, Prof. Louis McLeod.
Davenport, J. W. Leech.
Gallatin, J. S. Pound.
Garden City, W. C. T. Newell.
Goddard, Mrs. M. F. Goddard.
Kimball, A. S. Stuver.
Long Creek, Elizabeth Ingalls.
Parkston, John J. Swartz.
Webster, Arthur Betts.
Woonsocket, L. O. Libbey.

District of Columbia.

Kendall Green, Deaf and Dumb Institute
Receiving Reservoir, Distributing Reservoir, Rock Creek Bridge } Washington Aqueduct.

Florida.

Archer, Dr. J. C. Neal.
Duke, B. P. Ferrill.
Fort Meade, A. H. Adams.
Homeland, J. S. Wade.
Limona, J. G. Knapp.
Manatee, Mrs. Mary W. Broberg.
Merritt's Island, Rev. J. H. White.
Nama, Chas. E. Robbins.
Tallahassee, Rev. Dr. W. H., Carter.

Georgia.

Athens, Prof. L. H. Charbonnier.
Forsyth, Thos. G. Scott.
Marietta, G. S. Owen.
Milledgeville, S. A. Cook.

Idaho.

Lewiston, Robert Schleicher.

Illinois.

Collinsville, Dr. J. L. R. Wadsworth.
Jacksonville, P. J. Hasenstab.
Oswego, John S. Seely.
Palestine, John E. Templeton.
Pekin, Rev. J. E. Terborg.
Philo, H. A. Burr.
Riley, John W. James.
Rockford, T. D. Robertson.
Sycamore, Roswell Dow.
Sandwich, Dr. N. E. Ballou.
South Evanston, Dr. M. D. Ewell.
Windsor, A. H. Hatch.

Indiana.

Butlerville, C. F. Hole.
Jeffersonville, J. C. Loomis.
Laconia, Lafe Crozier.
La Grange, R. H. Rerrick.
Mauzy, Elwood Kirkwood.
Salem, J. W. May.
Sunman, B. F. Ferris.
Vevay, Prof. Chas. Boerner.

Indian Territory.

Caddo C[illegible]k, F. Leming, M. D.

Iowa.

Amana, C[illegible]rad Schadt.
Ames, J. L[illegible]sh Lincoln.
Auburn, Edwin Miller.
Bancroft, [illegible] N. Renfrew.
Clarinda, [illegible] S. Van Sandt.
Clear Lake, Dr. J. C. Wright.

Place of observation and observer.

Iowa—Continued.

Clinton, Luke Roberts.
Cresco, Gregory Marshall.
Cromwell, E. E. Harrison.
Denmark, G. B. Brackett.
Des Moines, Adolphus Voegeli.
Dysart, Jos. Dysart.
Elkader, J. N. Hamilton.
Fairfield, Geo. D. Clark.
Fort Madison, Miss L. A. McCready.
Glenwood, Seth Dean.
Glenwood, A. Schappel.
Grinnell, Prof. S. J. Buck.
Hampton, E. C. Grenelle.
Humboldt, Miss. Florence Prouty.
Independence Emil F. Wülfke.
Iowa City, Prof. A. A. Veblen.
Logan, Jacob T. Stern.
Manson, W. L. Thompson.
Maquoketa, A. B. Bowers.
Monticello, H. D. Smith.
Mount Vernon, Prof. Alonzo Collin.
Muscatine, J. P. Walton.
Osage, G. D. Pettingill.
Osceola, F. M. Kyte.
Oskaloosa, Joseph Boyd
Oskaloosa, O. H. Avey.
Sac City, Dr. Caleb Brown.
Smithland, Dr. Chas. Rice.
Vinton, T. F. McCune.
Washington, Wm. A. Cook.
Wesley, Wm. Ward.

Kansas.

Allison, John J. Cass.
East Norway, P. L. Gray.
Elk Falls, Dr. A. C. Williams.
Emporia, Prof. J. H. Dinsmore, jr.
Globe, Wm. Featherston.
Independence, J. M. Altaffer.
Lawrence, Prof. F. H. Snow.
Manhattan, C. P. Blachley.
Morse, R. P. Edgington.
Ninnescah, E. Shaw.
Salina, J. H. Gibson.
Scott, L. C. Vickrey.
Tribune, S. B. Jackson.
Wakefield, Wm. P. Cochran
Wellington, John H. Wolfe.
Wilson, E. Y. Dollenmayer.
Yates Centre, F. R. Gray.

Kentucky.

Bowling Green, M. H. Crump.
Carlisle, W. H. Fritts.
Frankfort, E. C. Went.
Shelbyville, W. H. Stuart.

Louisiana.

Grand Coteau, Rev. C. M. Widman, S. J.
Liberty Hill, E. A. Crawford.
Luling, F. M. Rogers.
Port Eads, Mrs. C. L. Kleinpeter.

Maine.

Bar Harbor, Joseph Wood.
Cornish, Silas West.
Gardiner, Rev. Charles L. Wells.
Kent's Hill, W. C. Strong.
Orono, Prof. M. C. Fernald.

Maryland.

Barron Creek Sp'gs, Albert E. Acworth
Cumberland, E. T. Shriver.
Faliston, Prof. G. G. Curtis.
Gaithersburg, John T. De Sellum.
Great Falls, Washington Aqueduct.
McDonogh, McDonogh Institute.
Mount St. Mary's, M't St. Mary's College
Woodstock, Woodstock College.

Massachusetts.

Amherst, Miss S. C. Snell.
Amherst, Massachusetts Agricultural Experimental Station.
Blue Hill, Rev. A. K. Teele.
Blue Hill Observatory, A. L. Rotch.
Cambridge, Harvard College Obs'y.
Dudley, Conant Observatory.
Deerfield, Rev. A. Hazen.
Fall River, C. V. S. Remington.
Heath, B. B. Cutler.
Marion, J. E. Hadley.
New Bedford, Thomas R. Rodman.
Provincetown, John R. Smith.
Somerset, Elisha Slade.
Westborough, G. S. Newcomb.
Williamstown, Williams College Obs'y.
Worcester, J. B. Hall.

Michigan.

Benton Harbor, A. J. McCave.
Hudson, Major A. H. Boies.
Kalamazoo, W. A. Black.
Lansing, Dr. H. B. Baker.
Marshall, W. T. Drake.
Mottville, J. A. Hartzler.
Traverse City, S. E. Wait.

Place of observation and observer.

Minnesota.

Minneapolis, Wm. Cheney.

Mississippi.

Biloxi, Dr. R. G. Hinsdale.
Jackson, W. J. Brown, Jr.
Palo Alto, W. H. Hill.

Missouri.

Conception, Rev. M. Eckstein.
Frankford, W. W. Vermillion.
Pierce City, J. J. Spilman.
Warrenton, Prof. J. H. Frick.

Montana.

Virginia City, Eugene Stark.

Nebraska.

Culbertson, G. D. Carrington.
De Soto, Chas. Seitz.
Fairbury, Dr. J. Humphrey.
Fremont, Rev. L. F. Berry.
Genoa, Geo. S. Truman.
Grand Island, J. H. Warren.
Hay Springs, Wm. Waterman.
Kimball, Wm. G. Barton.
Lincoln, University of Nebraska.
Marquette, John Ellis,
Syracuse, P. W. Risser.
Tecumseh, W. L. Dunlap.

Nevada.

Carson City, Chas. W. Friend.

New Hampshire.

Antrim, Frank W. Palmer.
Berlin Mills, Q. A. Bridges.
Concord, W. L. Foster.
Nashua, Chas. H. Webster.
Ashland, Belmont, Bristol, Lake Village, Weir's Bridge, Wolfeborough, } Lake Winipiseogee Cotton and Woolen Manufacturing Co.

New Jersey.

Beverly, C. F. Richardson.
Clayton, W. T. Wilson.
Egg Harbor City, H. Y. Postma.
Moorestown, Thos. J. Beans.
Readington, John Fleming.
South Orange, Dr. W. J. Chandler.
Vineland, Dr. O. H. Adams.

New Mexico.

Albuquerque, S. M. Rowe.
Colidge, H. M. Moran.
Gallinas Spring, J. E. Whitmore.
Las Vegas, F. W. Chatfield.

New York.

Ardenia, Richard B. Arden.
Auburn, Geo. Casey.
Boyd's Corners, Thomas Manning.
Brooklyn, Prof. W. C. Peckham.
Cooperstown, G. Pomeroy Keese.
Eden, W. P. Hunt.
Factoryville, T. P. Yates.
Geneva, Mrs. C. K. M. Yates.
Humphrey, Chas. E. Whitney.
Ithaca, Cornell University.
Lyon, Dr. M. A. Veeder.
Palmyra, L. D. Cummings.
Penn Yan, Geo. R. Young.
Rose, George Smart.
Setauket, Selah B. Strong.
Utica, Thomas Birt.
Vermillion, E. B. Bartlett.
White Plains, Prof. O. R. Willis.

North Carolina.

Chapel Hill, Prof. J. W. Gore.
Hot Springs, Dr. C. F. McGahan.
Lenoir, Dr. R. L. Beall.
Marion, A. Blanton.
Statesville, W. A. Eliason.
Tarborough, E. V. Zreiler.
Weldon, T. A. Clark.

Ohio.

Bellevue, Wm. Sheffield.
Cleveland, G. A. Hyde.
College Hill, John W. Hammitt.
Elyria, C. W. Goodspeed.
Garrettsville, S. M. Luther.
Jacksonborough, Dr. J. B. Owsley.
Lordstown, W. S. Dean.
Napoleon, Dr. T. C. Hunter.
New Athens, T. M. Sewell.
North Lewisburg, H. D. Gowey.
Portsmouth, Dr. D. B. Cotton.
Ruggles, Peter Bowman.
Tiffin, Rev. T. H. Sonedecker.
Wauseon, Thos. Mikesell.
Westerville, Prof. John Haywood.
West Milton, Luke S. Motte.
Yellow Springs, Chas. W. Rice.

Oregon.

Albany, John Briggs.
Bandon, Geo. Bennett.
East Portland, Dr. Geo. Wigg.

Place of observation and observer.

Oregon—Continued.

Eola, Thos. Pearce.
La Grande, J. K. Romig.
McMinnville, Prof. W. J. Crawford.
Yaquina L. H, Dr. John G. Jessup.

Pennsylvania.

Altoona, Chas. B. Dudley, M. D.
Catawissa, Robt. M. Graham.
Corry, Wm. Loveland.
Drifton, H. D. Miller.
Dyberry, Theo. Day.
Easton, Dr. J. W. Moore.
Franklin, Joseph Bell.
Grampian Hills, Nathan Moore.
Meadville, David Logan.
Phillipsburg, L. Ray Morgan.
Quakertown, J. L. Heacock.
Reading, C. M. Dechant.
Salem Corners, T. B. Orchard, M. D.
State College, Agricultural Experimental Station, State College.
Troy, M. Gustin.
Wellsborough, Hiram D. Deming.
West Chester, Dr. Jesse C. Green.
Westtown, Wm. F. Wickersham.

South Carolina.

Aiken, Dr. W. H. Geddings.
Black's, Jos. Black.
Cedar Springs, J. T. Bayerly.
Kirkwood, Colin Macrae.
Stateburg, Dr. W. W. Anderson.

Tennessee.

Ashwood, Rev. C. F., Williams.
Austin, P. B. Calhoun.
Milan, Dr. M. D. L. Jordan.

Texas.

Austin, Oscar Samostz.
Cedar Hill, J. P. Berry.
Cleburne, Dr. T. C. Osborn.
Colorado, Fred R. Blount.
Comanche, E. N. Wiesendanger.
Corsicana, W. H. Hamilton.
Decatur, H. D. Donald.
Gallinas, Lum Woodruff.
Lampasas, Dr. C. M. Ramsdell.
Mesquite, Silas G. Lackey.
Mexia, Chas. F. Mercer.
New Ulm, C. Runge.
Pine Mills, W. E. Burkett.
Silver Falls, C. M. Tilford.

Vermont.

Brattleborough, W. H. Childs.
Burlington, W. B. Gates.
Lunenburg, Dr. Hiram A. Cutting.
Manchester, Rev. E. P. Wild.
Middleburg, S. Holton.
Saint Johnsbury, F. Fairbanks.
Strafford, H. F. J. Scribner.

Virginia.

Bird's Nest, C. R. Moore.
Christianburg, H. D. Walters.
Marion, A. T. Lincoln.
Summit, J. R. Sim.
University of Va., James Wearmouth.
Variety Mills, J. H. Micklem.
Wytheville, Howard Shriver.

Washington Territory.

Blakeley, R. M. Hoskinson.
Tacoma, E. N. Fuller.
Vashon, Mrs. C. B. Carpenter.

West Virginia.

Clarksburg, R. T. Lowndes.
Hartmonsville, W. C. Tobb.
Helvetia, Dr. C. T. Stucky.
Middlebrook, S. F. H. Hewit.
Parkersburg, T. G. Field.
White Sulpher Springs, T. Surber.

Wisconsin.

Beloit, Beloit College Observatory.
Delavan, George L. Collie.
Deuster, G. H. Kruschke.
Embarras, J. E. Breed.
Fond du Lac, J. C. Wedge.
Fredonia, B. H. Meyer.
Lancaster, Edward Pollock.
Madison, Washburn Observatory.
Manitowoc, Miss Clasina Lüps.
Prairie du Chien, College of the Scared Heart.
Waucousta, G. H. Yapp.

Foreign.

Grand Turk, W. Indies, Geo. I. Gibbs.
Guanajuato, Mexico, Met'l Obs'y.
Hamilton, Bermuda, Russell Hastings.
Killisnoo, Alaska, Jos. Zuhoff.
Leon, Mexico, Prof. M. Leal.
Mexico, Mexico, Meteorological Obs'y.
Montreal, C. H. McLeod.
New Westminster, B.C., Capt. Adolphus Peele,

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for May, 1888.

Alabama.
Mount Vernon B'ks.
Arizona.
Huachuca, Fort.
McDowell, Fort.
Mojave, Fort.
Arkansas.
Hot Springs.
California.
Angel Island.
Alcatraz Island.
Benecia Barracks.
California—Cont'd.
Bidwell, Fort.
Gaston, Fort.
Mason, Fort.
Presidio of San F.
Colorado.
Lewis, Fort.
Dakota.
A. Lincoln, Fort.
Meade, Fort.
Pembina, Fort.
Randall, Fort.
Sisseton, Fort.
Dakota—Cont'd.
Sully, Fort.
Totten, Fort.
Yates, Fort.
Florida.
Staint Francis B'ks.
Idaho.
Boisé Barracks.
Sherman, Fort.
Indian Territory.
Gibson, Fort.
Reno, Fort.
Supply, Fort.
Kansas.
Hays, Fort.
Riley, Fort.
Maryland.
McHenry, Fort.
Michigan.
Brady, Fort.
Minnesota.
Snelling, Fort.
Montana.
Keogh, Fort.
Missoula, Fort.
Shaw, Fort.
Nebraska.
Niobrara, Fort.
Robinson, Fort.
Sidney, Fort.
Nevada.
McDermit, Fort.
New Mexico.
Bayard, Fort.
Selden, Fort.
Union, Fort.
Wingate, Fort.
New York.
Columbus, Fort.
Madison Barracks.
Niagara, Fort.
Plattsburg Barracks.
West Point.
Oregon.
Klamath, Fort.
Texas.
Concho, Fort.
McIntosh, Fort.
Ringgold, Fort.
Virginia.
Monroe, Fort.
Washington Ter.
Spokane, Fort.
Townsend, Fort.
Walla Walla, Fort.
Wyoming.
Laramie, Fort.
McKinney, Fort.
Sheridan, Camp.
Washakie, Fort.

State weather services from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for May, 1888.

Alabama, P. H. Mell, jr., Signal Corps, director, Auburn, Ala.
Arkansas, Prof. John C. Branner, director, Little Rock, Ark.
Colorado, Prof. F. H. Loud, director, Colorado Springs, Colo.
Illinois, Col. Charles F. Mills, director, Springfield, Ill.
Indiana, Prof. H. A. Huston, director, Lafayette, Ind.
Kansas, Prof. J. T. Lovewell, director, Topeka, Kans.
Louisiana, R. E. Kerkam, Sgt., Signal Corps, director, New Orleans, La.
Michigan, N. B. Conger, Sgt., Signal Corps, director, Lansing, Mich.
Minnesota, Prof. W. W. Payne, director, Northfield, Minn.
Mississippi, Prof. R. B. Fulton, director, University, Miss.
Missouri, Prof. F. E. Nipher, director, Saint Louis, Mo.
Nebraska, Prof. G. D. Swezey, director, Crete, Nebr.
Nevada, Prof. Chas. W. Friend, director, Carson City, Nev.
New England, Prof. W. H. Niles, President, Boston, Mass.
New Jersey, Prof. George H. Cook, director, New Brunswick, N. J.
North Carolina, Dr. Herbert Battle, director, Raleigh, N. C.
Ohio, Prof. Benj. F. Thomas, director, Ohio State University, Columbus, Ohio.
Oregon, B. S. Pague, Sgt., Signal Corps, Roseburg, Oregon.
Pennsylvania, under direction of Franklin Institute, Philadelphia, Pa.
South Carolina, Hon. A. P. Butler, director, Columbia, S. C.
Tennessee, J. D. Plunket, M. D., director; H. C. Bate, assistant. Nashville, Tenn.

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